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ABSTRACTS OF POSTERS



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**REPELLENCY EFFECTS OF COMMERCIAL FORMULATION OF
EUCALYPTUS EXTRACT ON RED FLOUR BEETLE, *TRIBOLIUM
CASTANEUM* HERBST**

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The red flour beetle, *Tribolium castaneum* Herbst is one of the most important stored product pest [1]. In this research the effect of commercial formulations of Eucalyptus extract, include gel formulation (Palizin) and tablet formulation (Eucalyptus tablets) on larval and adult stages of pest was investigated. The repellency was studied by tube-olfactometer method with different concentrations of gel formulations (0.5, 1, 5 & 10%) and also tablet formulations (Eucalyptus tablets). Repellency was analyzed by using completely randomized design and compared with Duncan test. The results showed that, Palizin is the most effective for repellency, and the repellency was correlated with plant extract concentration. According to result of Shakarami *et al.* compatible with our research: with higher concentration of Palizin, the higher repellency of pest was recorded [2].

The repellency effect of essential oil on adult stages is more than larval stages and also the gel formulation (Palizin) has more effective on adult stages than tablet formulation.

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**ANTIFUNGAL EFFECTS OF FENNEL OIL ON THE GROWTH OF
*ASPERGILLUS FLAVUS***

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Anethole has potent antimicrobial properties, against bacteria, yeast, and fungi. The essential oil analyses of the seeds of *Foeniculum vulgare* Mill. (apiaceae) collected from Kerman were obtained using gas chromatography and gas chromatography mass spectrometry. The study of antifungal effects of the oil sample tested against *Aspergillus flavus* (PTCC=5004) fungi by disc diffusion method. Twenty four compounds, accounting for 99.75% of the total oil with 2.75% oil yield were identified in the essential oil of the seeds. The main constituents of the essential oil were *trans*-anethole (49.64%), Fenchyl acetate (14.21%), estragole (8.67%), fenchone (6.37%) and limonene (4.23%). The results showed that the essential oil from Fennel at 1, 1/2, 1/4 and 1/8 oil dilutions exhibited strong antifungal activity on *Aspergillus flavus*. Large percentage antifungal activities of Fennel oil are related with *trans*-anethole of organic compound as the main compound. Fennel oil could have the medicinal uses against *Aspergillus flavus* considerable high antifungal activity.

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IN VITRO* ANTIFUNGAL AFFECTS ESSENTIAL OIL OF *ORIGANUM VULGARE* L. AND COMPARISON WITH SYNTHETIC THYMOL ON *ASPERGILLUS FLAVUS

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In order to identify chemical composition of essential oil of *Origanum vulgare*, the leaves with young branches of this plant which grows in a village in Kerman province at full flowering stage in May 2012 were collected. The sample was cleaned and then drying in the shade, making essential oil hydrodistillation method was performed. The main oil content from the plant of *Origanum vulgare* was 1.45% (v/w) that essential oil was analyzed by capillary gas chromatography (GC) using flame ionization (FID) and capillary gas chromatography coupled mass spectrometry (GC/MS) for detection. Twenty five compounds were identified in the essential oil of *Origanum vulgare* that concluded 98.95% of the total oil. The major components were Thymol (25.94%), Carvacrol (18.30%), Limonene (14.55%), α -pinene (10.97%) and caryophyllene (7.63%). The study of antifungal effects of the oil sample tested against strain of *Aspergillus flavus* (PTCC=5004) fungi by disc diffusion method via average inhibition zone. The results showed essential oil from Oregano plant at 1 and 1/2 oil dilutions exhibited strong antifungal activity than gentamycin (8 mg/ml) antibiotic on *Aspergillus flavus* and exhibited good of synthetic thymol was at 10% dilution. Large percentage antifungal activities of Oregano oil are related with thymol is a natural monoterpene phenol as the main compound.

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**ANTIMICROBIAL ACTIVITY OF *AVICENNIA MARINA* EXTRACT
AGAINST *STAPHYLOCOCCUS AUREUS***

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Finding antimicrobial compound with low side effects is important because of microbial antibiotics resistance. The gram positive bacterium such as *Staphylococcus aureus* is mainly responsible for post-operative wound infections, toxic shock syndrome, endocarditis, osteomyelitis and food poisoning [1]. In this study, mangrove leaves were dried in shadow and appropriate condition. After extraction with water, antimicrobial effect of extract were determined by "screening antibacterial activity" and "disk agar diffusion test" in 20, 40, 60 and 80 Percent concentration of the extract against *Staphylococcus aureus* PTCC 2592. The results showed that mangrove leaf extract in screening antibacterial activity method in 2000 µg/ml, inhibit *Staphylococcus aureus* growth. In "disk agar diffusion test, mangrove watery extract, in 60 and 80 percent concentration ,the mentioned extract have shown inhibition of pathogen growth, but there was no inhibitory on 20 and 40 percent. Results showed mangrove extract can be used as natural antimicrobial in food products.

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**ANTIMICROBIAL ACTIVITY OF *AVICENNIA MARINA* EXTRACT
AGAINST *ESCHERICHIA COLI***

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The ancient-Egyptians were familiar with many medicinal herbs and were aware of their usefulness in treatment of various diseases [1]. Some serotypes of *E. coli* can cause serious food poisoning in humans, and are occasionally responsible for product recalls due to food contamination. In this study, mangrove leaves were dried in Shadow and appropriate condition. After extraction with ethanol 96 degree, antimicrobial effect were determined by "screening antibacterial activity" and "disk agar diffusion test " at 20, 40, 60 and 80 Percent concentration of the extract against *E coli* PTCC 1330. The results show that alcoholic extract in screening antibacterial activity method at 2000 µg/ml, couldn't inhibit gram negative bacteria growth. In disk agar diffusion test, alcoholic extract have shown inhibition in 60 and 80 percent concentration of the extract but there was no inhibitory effect at 20 and 40 percent. Results showed mangrove extract can be used as natural antimicrobial in food products.

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STUDY OF MILK THISTLE (*SILYBUM MARIANUM L*) GERMINATION ATTRIBUTES AND SEED VIGOR UNDER SALINITY STRESS BY OSMOPRIMING ACCELERATORS

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Milk thistle (*Silybum marianum L.*), colloquially identified as *Carduus marianus*, known as milk thistle, is an annual or biannual plant of the Asteraceae family. Soil and water salinity in arid and semi-arid regions, is one of the most important stresses, can severely limit crop production. This study was conducted to evaluate the effects of the Priming on seed germination of Milk thistle under saline stress. The experiment was a factorial base completely randomized design (CRD) with three replications. The experimental factors were salinity stress including: (0, 62.2, 124.2, 186.2 and 248.8 mM) and three levels of priming, seed primed with KNO_3 (0.2 %, for the period of 72 hours), GA (500 ppm, during 48 hours) and hydro priming (water distiller, during 24 hours). A saline stress level treated by applies of NaCl, and for priming of distiller water use hydropriming technique. At the first stage, Milk thistle seed was treat and dried at 25°C, then subjected to saline stress treatments for two week at room temperature. The results showed that priming technique had a significant effect ($p \leq 0.01$) on seedling parameters. Among pretreatment, The KNO_3 had the most positive effect on germination coefficient (GC) and thus GA had the most positive effect on mean germination time (MGT). In order hand, these seeds at the minimum time had the most germination rate. Means comparing showed that the most and least rate of germination was obtained by KNO_3 and Hydro priming respectively. So under different level of saline stress, Pretreatments of KNO_3 and Hydro priming had useful effect on radical length, more lateral roots and higher proportion of root to plumule, and the most root and plumule fresh weight was obtain by hydro priming pretreatments. So pretreatment of 500 ppm GA reduced number of abnormal seedlings. Overall, application of seed priming with KNO_3 (0.2 %) for the period of 72 hours and GA (500 ppm) during 48 hours suggested for obtain uppermost germination characters.

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**EVALUATION OF HESPERIDIN FLAVONOID IN DIFFERENT
TISSUES DURING FRUIT DEVELOPMENT OF LIMON (*C. LIMON* CV.
EUREKA)**

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Hesperidin is main flavonoid in lemons that absorb the free radicals and prevent cancer. The aim of this study was to determine the best harvesting time of Eureka limon to achieve the highest hesperidin content of fruit. This investigation was carried out in a completely randomized block design with three replicates. The measured parameters were included fruit weight, diameter, peel thickness, dry matter and Hesperidin flavonoid in extract of various fruit tissues (Flavido, Albido and Flesh). Extraction was conducted by methanol and hesperidin content recorded by High Performance Liquid Chromatography (HPLC). Results showed that the fruit harvesting time significantly affected on measured parameters.

Fruit peel thickness at the first harvesting stage increased (5.73 mm) and then decreased (4.66 mm) during fruit development. Percentage of dry matter increased (21.55%) at the first harvesting stage and then decreased (12.16%). The hesperidin content of extract significantly affected by harvesting stage as the highest Naringin content of flavido, albido and flesh tissues achieved by 45 days after full bloom (685.29, 1165.76 and 733.49 ppm, respectively) and then declined. The maximum hesperidin content produced in albedo tissue.

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**INHIBITORY EFFECT OF TEA TREE OIL AND ALOE VERA LEAF
GEL SHAMPOO ON *MALASSEZIA FURFUR***

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Malassezia furfur, a lipophilic, dimorphic and yeast-like fungus, occurring in human skin as an opportunistic pathogen, causes diseases and physiological states such as dandruff, pityriasis versicolor, seborrheic dermatitis, etc. Dandruff may be defined as a chronic, non-inflammatory scaling of the scalp, characterized by massive desquamation of small flakes of stratum corneum, without evidence of any skin disease either on the scalp or elsewhere. The scales may be dried or trapped in a film or sebum. Dandruff is uncommon in infancy and early childhood but by puberty half of all males and females become affected and it may persist throughout life [1]. Dandruff must therefore be considered a physiological state, cosmetically important, rather than a disease. Hence, it seems too important for researchers to find natural remedies to control it [2]. In this research, suitable media for culturing the organism were standardized. A modified medium for the culturing of *M. furfur* has been proposed. Growth of the fungus was also determined under the influence of different temperature, pH and salinity. Plant extracts of two species were screened against the growth of the fungus and also was used as shampoos, by 50 volunteers who suffered from dandruff, and the results were discussed. Selection of an appropriate formula was based on antifungal activity against *M. furfur*, the physical appearance, the chemical properties and stability of the formula. At the end, the observations showed that five percent tea tree oil shampoo worked effectively on most of the volunteers. It provided the required qualities necessary for commercial use more than *Aloe vera* leaf gel shampoo. The toxicity studies of formulations did not show any toxic or irritating effect after 24 hours of the study [3].

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**EFFECT OF GAMMA IRRADIATION ON ANTIOXIDANT AND
ANTIMICROBIAL ACTIVITIES OF ECHINACEA
(*ECHINACEA PURPUREA L.*)**

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Echinacea purpurea L. is common pharmaceutical herbs among the various Echinacea species [1]. Echinacea belonging to the family Asteraceae and it contains valuable substances which used in producing medicine for influenza and also they are increases production of immunoglobulin G [2]. Chicoric acid is the main phenolic compound with antioxidant activity. Alkylamids does not have antioxidant activity on its own, but increases the antioxidant activity of chicoric acid [1]. Medicinal herbs and spices like other agricultural products are contaminated by microorganisms; which can be occurred during the process, storage and transportation. Gamma irradiation is an important among the most recent non thermal methods to decontamination of food products. Also, this is the safe known method to eliminate contamination of herbs and spices [3]. Therefore, the aim of the present study was to study the effect of gamma irradiation on antioxidant and antimicrobial activities occurring in *Echinacea purpurea* L. In this study, samples were exposed to gamma irradiation of 10, 15, 20 and 25 kGy. In order to undergo the sequence experiments, the hydroalcoholic extracts (EtOH 50%) were prepared. The antioxidant activity of irradiated and control samples was evaluated by DPPH radical scavenging, ferric reducing power (FRP), beta caroten bleaching and total phenolic content (TPC) of sampels. Broth diluting method was applied for the determination of minimal inhibitory concentration (MIC) on *E. coli* and *S. aureus*. All tests were performed in triplicate and differences among the means were determined using least significant differences (LSD) test at $\alpha = 0.01$. Results showed that by increasing the irradiation dose, FRP and TPC of samples increased and the other tests did not show any significant difference. Also, no significant effect was observed on antimicrobial activity of Echinacea extract. Finally, the results indicated that gamma irradiation treatment do not have any negative effect on antioxidant and antimicrobial activities of Echinacea. Therefore, gamma irradiation treatments up to 25 kGy is appropriate for Echinacea.

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**DEVELOPMENT OF A VALIDATED HIGH PRESSURE LIQUID
CHROMATOGRAPHY METHOD FOR SIMULTANEOUS
DETERMINATION OF STEVIOSIDE AND REBAUDIOSIDE A IN
SWEETENERS**

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Stevia rebaudiana (Stevia) is plant native to South America. The leaf of the Stevia plant contains sweet components, called steviol glycosides, including Stevioside, Rebaudioside A and others. The Stevia extract has been used as a sweetener around the world. Extracts are up to 300 hundred times sweeter than table sugar, which is attributed to the diterpenoid glycosides, stevioside and rebaudioside A. In the present study, a fast, simple and reliable method for the simultaneous determination and quantization of diterpenoid glycosides including Stevioside, Rebaudioside A in sweeteners has been developed. The chromatographic separation was carried out on a reversed phase Lichrospher-100- NH₂ column with eluting at a flow rate of 1.2 ml/min using an isocratic acetonitril:water(80:20) for 15 min. UV spectra were collected across the range of 200-900 nm, extracting 210 nm for the chromatograms. The method was validated according to linearity, selectivity, precision, recovery, LOD and LOQ. The method was selective for determination of stevioside and rebaudioside A. The calibration graphs of diterpenoid glycosides were linear with $r^2 > 0.997$. RSDs% of intra- and inter-day precisions were found 0.95-3.17&1.63-3.27 for stevioside, 0.86-3.13&1.13-2.64 for rebaudioside A which were satisfactory. LODs and LOQs were calculated as 3.9 & 11.8 for stevioside and 1.51 & 4.56 for rebaudioside A. The recovery averages of above mentioned diterpenoid glycosides were 92.03 and 103.66%, respectively. The simplicity of the method makes it highly valuable for quality control of sweeteners according to quantization of diterpenoid glycosides.



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**ALLELOPATHIC POTENTIAL OF MADDER (*RUBIA TINCTORUM*)
EXTRACTS ON FIELD BINDWEED (*CONVOLVULUS ARVENSE* L.)
AND CORN (*ZEA MAYS* L.) GERMINATION CHARACTERISTICS**

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To investigate the allelopathic potential of madder extract as a medicinal plant on field bindweed and corn initial growth, a laboratory experiment was conducted at the University of Applied Science, Yazd, in 2011. The experimental design was completely randomized with 4 replicates. A factorial set of treatments including 5 levels of water extract (0, 25, 50, 75, and 100 %) and 2 plants' seeds (field bindweed and corn) were arranged. After two weeks, with increasing the extract concentration above 25% in field bindweed, and 50% in corn germination percentage and germination rate decreased significantly. The highest inhibitory effect on root length (93.2%) and shoot length (86.1%) was obtained in field bindweed when exposed to 100% extract. Generally, field bindweed was more sensitive to suppressive effect of madder than corn. It is appeared that applying 50% of tissue extract of madder may suppress field bindweed growth without detrimental impact on initial growth of corn. Applying extract of medicinal plant such as madder may be a promising approach in biological control of noxious weed in corn fields.

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**SUPPRESSING EFFECTS OF RHUBARB (*RHEUM RIBE*) EXTRACTS
ON PURSLANE (*PORTULACA OLERACEA*) AND ALFALFA
(*MEDICAGO SATIVA*) SEEDLING GROWTH**

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A laboratory experiment was conducted to determine the suppressing effects of rhubarb residue extract on alfalfa and purslane seedling growth at the University of Applied Science, Yazd in 2011. The experimental design was completely randomized with 4 replicates. A factorial set of treatments including 5 levels of water extract (0, 25, 50, 75, and 100 %) and 2 plants seeds (alfalfa and purslane) were arranged. Rhubarb extract had no significant effect on germination of alfalfa but it caused a significant reduction ($p \leq 0.05$) in germination of purslane (75 %) even at the lowest level of 25 %. Germination rate for both alfalfa and purslane was significantly reduced ($p \leq 0.05$) in the rhubarb extract of 25% when compared with distilled water, with purslane being more sensitive (reduction of 83%) than the alfalfa (reduction of 41%). Root and shoot of purslane were severely inhibited (80%) by rhubarb extract at the rate of 50 %. However, the inhibitory effect of rhubarb extract at the rate of 50 % on root and shoot of alfalfa was 37 %. Results indicated that extract of rhubarb as a useful medicinal plant may contain allelochemicals that could suppress purslane seedling growth and thus may be used to control purslane in alfalfa fields.

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**EFFECT OF DORMANCY BREAKING TREATMENTS ON
GERMINATION CHARACTERISTICS OF ACACIA
(ALBEZIA LEBBEK)**

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Acacia (*Albezia lebbek*) is a useful medicinal plant distributed in south of Iran and the hard seed rate of acacia reaches to 93%. Seed of acacia was collected from Agriculture Research Station of Darab and subjected to different dormancy breaking treatments including potassium nitrate solution 0.2 M (24h), stratification (1, 2, and 3 weeks), soaking in tap water (24, 48 and 72 h), soaking in sulfuric acid 50% (5, 10 and 15 min), scarification by gravel sand, and control. The experiment was conducted as completely randomized design with 4 replicates in Shiraz University, during 2011. Results showed the highest germination percentage was obtained in 3 weeks stratification treatment (91.6%). Maximum germination velocity was observed in stratification for 2 weeks, whereas the lowest rate was gained in potassium nitrate solution 0.2 M. Scarification by gravel or sulfuric acid caused a significant decrease in germination characteristics, germination rate and percentage. It appeared that acacia had more physiological dormancy than physical dormancy and the best way for dormancy breaking of acacia was stratification for 3 weeks.

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INVESTIGATION OF CHEMICAL ESSENTIAL OIL COMPONENTS OF
CHAEROPHYLLUM MACROSPERMUM IN KANDOVAN

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Chaerophyllum genus includes 30 species, which there are 8 native species in Iran, such as; *Chaerophyllum nival* and *Chaerophyllum khorassanicum*. This study was conducted components of essential oil in root and shoot of *Chaerophyllum macrospermum*. Samples were collected in Gajere Dizin of Kandovan in 2011. The produced samples in shadow dried and extracted by Clevenger device as Hydrodistillation method. After producing essences, kind of components and percent of essential chemical components recognized and separated completely by using GC and GC/MS devices. In the plant investigated leaves and stems have not essence but roots have essence. The results pointed out that 19 components (about 93.12% of essences in species) as main component mentioned; Octadecanoic Acid (49.71%), Hexadecanoic Acid (9.90%), 1,8-Cineole (9.49%) and Viridi florol (6.3%). According to this study and other research most of the essences components are Monoterpenes and Sesquiterpenes but kind of components were different. It may affected by environmental and husbandry techniques such as; time of collecting, place of plant growing and climate changes of region factors. This factors effect on biosynthesis of essential in time and place.

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EVALUATION EFFECTS OF ANTIMICROBIAL THYME ESSENTIAL OIL ON LOADS MICROBIAL AND QUALITATIVE CHARACTERISTICS OF FRESH-CUT CARROT VILMORIN CULTIVAR IN DURATION STORAGE

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Consumer demand for convenient and ready to use food that requires minimum effort and time for their consumption lead to made of industrials for produce a minimal processed products (fresh-cut). The main issues in the manufacturing of these products are remove infectious agents (bacteria) to these products. Manufacturing these products is consumers looking to replace the natural antimicrobial agents, rather than synthetic (chemical) disinfectants. Chemical synthetic additives can reduce decay rate. But consumers are concerned about chemical residues in the product, which could affect their health and cause environmental pollution [1]. Therefore, alternative methods for controlling fresh-cut fruit decay are required. One of the major emerging technologies for reducing quality loss and safety assurance of fresh-cut fruits and vegetables is the application of natural additives. In this study the effect of different levels of thyme essential oil (0, 250, 500 and 1000 ppm) along with packaging in modified atmosphere (5% O₂, 5% CO₂ and N₂ 90%) and five times the storage (4, 8, 12, 16 and 20 days) on the total count of microorganisms, Total yeast and mold, Vitamin C and Total carotenoids were investigated. The survey results showed that with increasing storage time, total count of microorganisms and total yeast and mold to rise upward. Also with increasing storage time Vitamin C and Total carotenoids decreased. Levels used of thyme essential oil than control (level 0) to dramatically reduce microbial contamination on fresh-cut carrots. The best antimicrobial effect on total count of microorganisms and total yeast and mold in duration storage was related to the level of 1000 ppm essential oil. Also best maintains of Vitamin C and Total carotenoids related to the level of 1000 ppm thyme essential oil.

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**THE STUDY OF EFFECTS OF BERBERIS VULGARIS
HYDRIETHANOLIC EXTRACTS ON SERUM BILIRUBIN LEVEL AND
AENZYMES OF THE LIVERIN MALE CHOLESTATIC RATS.**

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Liver disorders, such as hepatitis, are more risk factors in human society which associated with hyper bilirubinemia. Some of drug plants have hypo bilirubinemic effect [1]. In this study the hypo bilirubinemic effects of *Berberis vulgaris* (BV) was investigated and its hydroethanolic extract was prepared. 40 male rats divided in 5 groups (control, sham, cholestatic, cholestatic treated with 40% extract, cholestatic treated with Phenobarbital) randomly. Choletasis was induced by ligation of main bile duct using two ligatures and transsection the duct (BDL). After 3 days the cholstasis showed with hyperbilirubinemia. The cholsetatic animals were treated by BV 40% extract (300,600mg/kg, IP) and phenobarbital (15mg/kg) for a week. Blood samples were collected by cardiac puncture and serum total, indirect, direct bilirubine, ALT, AST and ALP were analyzed. All data were compared by ANOVA and tukey test and differences with $P < 0.05$ were considered significantly. These data showed that the BV extract has hypobilirubinemic effects and decreased bilirobin and liver enzymes in cholestatic rats compare with control and sham groups. The hypobilirubinemic BV extract effect may be due to its compositions that affects in liver to decrease the boold bilirubin or increase bilirubin renal excretion

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**THE EFFECT OF AQUEOUS EXTRACT OF *ALLIUM SATIVUM* ON
BEHAVIORAL CHANGES IN PARKINSON MALE RAT**

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Parkinson's disease (PD) accompanies with degeneration of dopaminergic neurons of substantia nigra pars compacta and other regions of brainstem. Oxidative stress plays an important role in neuronal death in PD. This study was conducted to evaluate the effect of aqueous extract of *Allium sativum* on motor asymmetry in a model of PD. Male rats (n = 21) were divided into 3 groups: control, 6-hydroxydopamine-lesioned, and treated-lesioned. Treatment group received the extract (i.p.) at a dose of 10 mg/kg for 10 consecutive days (from 6 days before neurotoxin injection). At the end, apomorphine-induced rotations and muscle stiffness (Marpago test) were evaluated.

6-OHDA neurotoxin injection caused very significant contralateral rotations (191.7 ± 55.8) in lesioned group as compared to control group (17.7 ± 9.7) ($p < 0.05$) and treated lesioned group showed lower rotations (21.7 ± 6.3) as compared to lesioned group ($p < 0.05$). There were no significant differences among the groups regarding muscle stiffness. Aqueous extract of *Allium sativum* possibly due to its antioxidant and anticholinergic activity could reduce motor asymmetry in experimental model of PD which may be helpful as an auxiliary treatment.

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INVESTIGATION OF CHEMICAL ESSENTIAL OIL COMPONENTS OF
THYMUS ERIOCALYX IN PERESK AREA
(IN ALASHTAR-LORESTAN PROVINCE)

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Lamiaceae family has about 200 genus and 4000 species which one of them is Thymus. Majority spices of the family have essence and uses for medicinal, nutritional, toiletry and health industrial. The genus includes many species in Iran. This study was conducted components of essential oil in biomass of *Thymus eriocalyx*. Samples were collected in Peresk area when plant was growth as flowering (in Alashtar-Lorestan Province) in 2011. At the first time investigated anatomical by using coloring and then the produced samples in shadow dried and extracted by Clevenger device as Hydrodistillation method. The result show that there is no significant different between the species with *lancifolious* and *kotschyanus* species in terms of botanical properties. After producing essences, kind of components and percent of essential chemical components recognized and separated completely by using GC and GC/MS devices. According to components retention volume, retention time, Kovats retention index, mass spectrum and comparing those to standard components the results pointed out that 43 components (about 98.28% of essences in species) as main component such as; Thymol (42.60%), Carvacrol (32.33%), Cymol (4.05%), Gamma-terpinen (3%) and Borneol (2.12%). This study and most of the other researches were alike result according to main components of essences in the species but deal was different. It may affected by environmental and husbandry techniques such as; time of collecting, place of plant growing and climate changes of region factors. This factors effect on biosynthesis of essential in time and place.

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INVESTIGATION OF CHEMICAL ESSENTIAL OIL COMPONENTS OF
THYMUS LANCIFOLIUS IN ZAGHEH AREA
(IN LORESTAN PROVINCE)

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Lamiaceae family has about 200 genus and 4000 species which one of them is *Thymus*. Majority species of the family have essence and uses for medicinal, nutritional, toiletry and health industrial. The genus includes many species in Iran. This study was conducted components of essential oil in biomass of *Thymus lancifoliosus*. Samples were collected in Zagheh area when plant was growth as flowering (in Lorestan Province) in 2011. At the first time investigated anatomical by using coloring and then the produced samples in shadow dried and extracted by Clevenger device as Hydrodistillation method. The result show that there is no significant different between the species with *eriocalyx* and *kotschyanus* species in terms of botanical properties. After producing essences, kind of components and percent of essential chemical components recognized and separated completely by using GC and GC/MS devices. According to components retention volume, retention time, Kovats retention index, mass spectrum and comparing those to standard components the results pointed out that 45 components (about 95.85% of essences in species) as main component such as; Carvacrol (52.34%), Thymol (16.43%), Gamma-terpinene (10.86%) and Cymol (3.26%). This study and most of the other researches were alike result according to main components of essences in the species but deal was different. It may affected by environmental and husbandry techniques such as; time of collecting, place of plant growing and climate changes of region factors. This factors effect on biosynthesis of essential in time and place.

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EFFECT OF DIFFERENT SOIL SERIES AND MANURE APPLICATION ON DRIED FLOWER YIELD, ESSENTIAL OIL AND CHAMAZULENE CONTENT AND ESSENTIAL OIL YIELD OF GERMAN CHAMOMILE

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German Chamomile (*Matricaria chamomilla* L.) is cultivated in many countries because of its great interest for pharmaceutical, cosmetics and food industries [1]. In order to investigate the effects of different soil series and manure application on dried flower yield, essential oil and chamazulene content and essential oil yield of German Chamomile, a factorial experiment was performed in a randomized complete block design (RCBD) with three replications. Ten soil series were selected based on the soil map with the scale of 1:50,000 from Shahrekord plain in Chaharmahal–Va–Bakhtiari province. Soil samples were collected from 0-30 cm depth of the soil series. Before cultivation, 136.5 gr (equal to 30 ton/ha) of the cattle manure was mixed with the soil of each target pot. Soil physicochemical properties were determined. Univariate and multivariate analyses were performed on dataset. Results showed significant differences for dried flower yield and chamazulene content between different soil types. Moreover pots amended with manure produced maximum dried flower yield and chamazulene percentage compared to control. Multivariate Analysis showed among different soil properties, the content of sulfur, phosphorus, potassium and organic matter of the soil had more pronounced effect on dried flower yield, chamazulene percentage and essential oil yield.

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**EFFECT OF MANURE APPLICATION ON ESSENTIAL OIL
CONTENT, ESSENTIAL OIL YIELD AND CHAMAZULENE CONTENT
OF GERMAN CHAMOMILE IN DIFFERENT SOIL SERIES OF
CHAHARMAHAL–VA–BAKHTIARI PROVINCE**

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German Chamomile (*Matricaria chamomilla* L.) is one of the most representative medicinal plants. It is an annual herb which grows wild, but is also cultivated in many countries. Manure application is more beneficial for plants compared to chemical fertilizers [1]. Chemical fertilizers just provide one or some essential elements, while organic fertilizers provide most of the micro and macro nutrients for plants [2]. In order to investigate the effects of manure application on essential oil content, essential oil yield and chamazulene content of German Chamomile, a factorial experiment was performed in a Randomized Complete Block Design (RCBD) with three replications. Ten dominant soil series were selected from Shahrekord plain in Chaharmahal–Va–Bakhtiari province, Iran. Before cultivation, 136.5 gr (equal to 30 ton h⁻¹) of the cattle manure was mixed with the soil of each target pot. At harvest time, the content of essential oil, essential oil yield and chamazulene percentage were determined. Essential oil isolation was performed by steam distillation procedure using Clevenger apparatus. Essential oil yield was calculated by multiplying of dried flower yield in essential oil content. Results showed that the manure application had a significant effect on chamazulene percentage ($\alpha > 0.05$) and its amount increased by manure application. However, no significant difference could be detected for essential oil content and essential oil yield between pots which amended by manure compared to control.

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**CHEMICAL COMPOSITIONS AND ANTIMICROBIAL ACTIVITY OF
ESSENTIAL OIL OF *PHLOMIS CANCELLATA* BUNGE. FROM
MAZANDARAN**

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Phlomis cancellata Bunge. is a native plant belongs to Labiatae family which can used more in modern medicine and different industries for its essential oil particulars, in addition to Iranian folk medicine [1]. In this study, *P. cancellata* were collected in full flowering stage from mountain of Gaduk area in Mazandaran province, Iran. After they were dried up in the lab temperature, the aerial parts of *P. cancellata* were subjected to hydrodistillation (HD) in a Clevenger – type apparatus [2] until there was no significant increase in the volume of the oil collected (5h). The yield of the oil was 0.85% (w/w). The essential oil was analyzed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). Identification of the components was based on GC retention indices computer matching with Wiley GC-MS library, and by comparison of the fragmentation patterns of the mass spectra with those reported in the literature [3]. Totally 45 components were identified which contained 95.8% of the oil. Hexadecanoic acid (17.3%), germacrene D (14.6%), eudesmol (8.5%), octacosane (5.6%), (*E*)-caryophyllene (5.4%), heptacosane (4.9%) and pentacosane (3.6%) were major components in *P. Cancellata* oil. *In vitro* antimicrobial activity of essential oil of *P. cancellata* against a panel of four strains of bacteria have shown larger growth inhibition zone diameters (21 and 25 mm) against the gram-positive tested bacterial strains compared with gram-negative bacteria (13 and 14 mm), in comparison with a standard antibiotic, Streptomycin (12 mm). Antimicrobial activities of essential oil was also tested by minimum inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) method, utilizing four gram-positive and gram-negative microorganism, exhibited the same results (MIC 4 and 8 µg/ml and MBC 8 and 16 µg/ml, against gram-positive bacteria, and also MIC 16 and 32 µg/ml and MBC 32 and 32 µg/ml, against gram-negative bacteria).

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**EFFECT OF *RUTA GRAVEOLENS* EXTRACT ON HISTOPATHOLOGIC
CHANGES IN MICE LIVERS**

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Ruta had been used in different nation traditional medicine specifically in Iranian traditional medicine and marked properties had been mentioned for it. In old references using Ruta in some cases caused failure in vital organs of body such as liver and kidney and also mortality. This study had been performed to survey effects of Ruta graveolens extract on histopathologic changes in mice livers. This is an experimental study which made on 30 NMRI mice in the weight range of 25 to 35 gr. Mice were divided in 6 quintuple groups. Groups 1 to 4 injected by the doses of 200,300,400 and 500 mg/kg of hydro-alcoholic extracts respectively. Solvent of extract injected in group 5 mice and group 6 mice were intact. The injection was performed intraperitoneal and three times in a week. In the 7th day mice were injected by ketamine-xylisine and were anesthetized deeply then liver tissues were extracted and after H&E coloring analyzed pathologically.

Different pathologic factors were studied in liver of mice. Only common positive factor in all groups were a little inflammation around portal space in comparison with control group. Pathologic results show that inflammation and cell infiltration was increased dose dependent. Any fatty change, fibrosis and evidences of cholestasis were not seen and there was no change in control group subjects. It seems that different doses of hydro-alcoholic extract of Ruta graveolens had no toxic effect on histopathology of liver. In order to the results using Ruta in researches as a safe drug is recommended.



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**COMPOSITION OF FREE AND GLYCOSIDICALLY BOUND
VOLATILE COMPONENTS OF *ACHILLEA TENUIFOLIA* LAM. ROOT**

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Essential oils from *Achillea* sp. (Compositae) are in great concern, since they have several different biological activities. *Achillea tenuifolia* is an herbaceous plant which is abundant in Iran. In this study root of the plant was subjected to 4h hydrodistillation in a Clevenger-type apparatus. Afterwards hydrochloric acid was supplemented to the plant materials which remained overnight and hydrodistilled another time for 4h. Essential oils of the plant were successfully collected and dried over anhydrous sodium sulphate. The hydrodistilled essential oils were analyzed by GC-MS method. Identification of the essential oils before acid treatment and after acid hydrolysis resulted in recognition of 24 constituents (95.34% of the total oil) and 29 constituents (94.2% of the total oil), respectively. Palmitic acid (36.58%), 5-dodecyldihydro-2(3H)-furanone (14.9%) and pentadecanoic acid (5.66%) were the major constituents of essential oil without acid treatment. After acid hydrolysis, the major volatile aglycones were identified as Iso-valeric acid (24.9%), palmitic acid (15.8%), cyclohexane (13.26%), cyclohexadecanolide (7.16%) and 5-dodecyldihydro-2(3H)-furanone (6.07%). Variation in quality, quantity and in composition according to procedure of essential oil preparation was observed. In addition, moderate resemblance was discovered between free components of essential oil and volatile aglycones.



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**STUDY GENE EXPRESSIONS OF CINNAMYL ALCOHOL-
DEHYDROGENASE, LIGNIN AND LIGNAN COMPOUNDS AT
DIFFERENT ORGANS OF *LINUM ALBUM***

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Lignans form a group of phenylpropanoid that found in different organs of plants. Plants with high lignan content were commonly used in Chinese, Japanese, and the Eastern world folk medicine, for example, *Kadsura coccinea* (*Schizandraceae*), *Fraxinus sp.* and *Olea europaea* (*Oleaceae*). In Chinese traditional medicine lignans are used for treatment of viral hepatitis and protection of the liver [1]. Podophyllotoxin (PTOX) is a lignan which occurs in wide range of plant species and is pharmacologically significance because of its anticancer activities. It is used as a precursor for chemical production of some anticancer drugs such as etoposide, teniposide and etopophose. Lignin is a phenyl propanoid type polymer that formed by polymerization of three p-hydroxycinnamyl alcohols. Lignification, the process of collective formation of phenylpropanoid macromolecules and the polymerization of cinnamyl alcohols is also mediated by peroxidases. Lignan biosynthesis pathway relates directly to lignin. *L. album* is an endemic medicinal species in Iran, which have considerable amounts of lignan compounds in its organs [2]. Lignans, lignin are produced via the so-called phenylpropanoid pathway. cinnamyl alcohol-dehydrogenase (CAD) and pinoresinol-larisiresinol reductase (PLR) are key enzymes in phenylpropanoid biosynthesis pathway. In this research, podophyllotoxin, Lignin amounts and expression level of CAD and PLR genes were investigated at different organs of *L. album* collected from taleghan, damavand and lashkarak. Results showed Lignin was greater in root. Level of CAD expression was correlated with Lignin content. The level of podophyllotoxin was significantly greater in flowers. Then flowers are the storage organs of podophyllotoxin of *L. album* and Level of PLR expression was correlated with podophyllotoxin content.

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**ANTIPROLIFERATIVE EFFECTS OF *FERULA GUMMOSA* EXTRACTS
ON DIFFERENT CANCER CELL LINES**

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Cancer is the leading cause of death in economically developed countries and the second leading cause of death in developing countries. Currently, natural products have been shown to present interesting biological and pharmacological activities and are used as chemotherapeutic agents. Plants have historically been used in treating cancer and are recognized for their ability to produce secondary metabolites. Galbanum (*Ferula gummosa* Boiss., Umbelliferae) has medicinal applications to treat a wide range of diseases such as cancer [1-2]. The current study was designed to evaluate the antiproliferative activity of ethanol and acetone extracts as well as aqueous extract from gum and seeds of *Ferula gummosa*. The total phenolics and flavonoids contents of these extracts were also determined by Folin–Ciocalteu and aluminum chloride colorimetric methods [3]. Antiproliferative activity was evaluated by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay against human oral cancer (BHY), human breast adenocarcinoma (MCF-7) and human malignant melanoma (SKEL3) cell lines at 24, 48 and 72h. Our results demonstrated that acetone and ethanol extracts have the lowest IC₅₀ values (0.06-0.004 & 0.001-0.01 mg/ml), respectively. It is important to mention that both extracts indicated more remarkable antiproliferative efficiency at 72 h in the three cell lines. In addition, the colorimetric methods showed that gum and aqueous extracts possessed the highest amount of total phenolics and flavonoids, respectively (0.12 ± 0.037, 0.01 ± 2.51 mg/g of dry powder). Generally, the results obtained herein indicate that Galbanum acetone and ethanol extracts may contain effective compounds which can be used as a chemotherapeutic agent.

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**INVESTIGATION ANTIBACTERIAL ACTIVITY OF ESSENTIAL OILS
FROM PLANT FAMILY LAMIACEAE ON TREE BACTERIAL SPECIES**

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Medicinal plants and herbs have been used for many years in treating various animal and human diseases. Secondary metabolites from medicinal plants are widely unexploited in 'conventional' animal production systems. The aim of the investigation was to study antimicrobial activities of three essential oils on three bacterial species (*Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecalis*) obtained from the microbiological laboratory of MRI hospital in Shiraz from Iran. The plants used in this study were oregano (*Origanum vulgare L.*), thyme (*Thymus vulgaris L.*) and wild thyme (*Thymus serpyllum L.*), all members of Lamiaceae family. The antibacterial activity of essential oils was tested by disc diffusion method and broth micro-dilution susceptibility assay, according to the National Committee for Clinical Laboratory Standards Guidelines. All the tested oils demonstrated antimicrobial activity on used bacterial strains. The analysis of variance revealed that there were highly significant differences ($P < 1\%$) between the effects of essential oils, concentrations and interactions of essential oils within all tested groups of bacteria. The strongest antibacterial effect was shown by oregano essential oil, while the oil extracted from wild thyme was least potent. The antibacterial activity of essential oils declined with decreasing concentration, regardless of the tested bacteria. Antibacterial effects of essential oils showed by broth micro-dilution method are in accordance with the results of a preliminary screening performed by the disc diffusion method.



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**EFFECTS OF BIOLOGIC AND ORGANIC FERTILIZERS ON
MENTHA PIPERITA IN HYDROPONIC CONDITION**

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In order to evaluate the effects of mycorrhizal inoculation, root juice (a biofertilizer) and citric acid on rooting of the medicinal plant *Mentha piperita*, an experiment was conducted in 2011 in greenhouse condition at the research field of Islamic Azad University, Karaj branch, Iran. The experimental design was factorial on the basis of completely randomized design with four replications and eight treatments: *Mycorrhiza* ($M_0=0$, $M_1=100$ kg/ha), root juice ($R_0=0$, $R_1=5$ cc) and citric acid ($C_0=0$, $C_1=5$ mM). Applying 5 mM citric acid significantly ($P \leq 0.05$) increased root volume by 48.01% and the number of root nodules by 26.1% compared with the control. The interaction of citric acid \times root juice had, also a significant effect on the number of rooted nodules ($P \leq 0.05$); the highest number of root nodules was achieved in C_1R_0 .



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**INVESTIGATE EFFECT OF DIFFERENT NURSERY BED ON
MARCOTTING ROSEMARY CUTTING**

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Rosemary (*Rosemarinus officinalis*) is one of the oldest medicinal plants used by humans. Nowadays, in addition to pharmaceutical and healthcare industry, it has many implications for the design of urban green spaces. These plants reproduce both by sexually and unsexually methods, but the most suitable method of vegetative propagation of cuttings is a semi-hard wood cutting [1, 2]. In order to show that, it was done a completely randomized design (CRD) experiment with 4 treatments and 3 replications in a cold frame in the Research Department (Jahad-e-Daneshgahi), Kermanshah in 1390. Experimental treatments of different bed cultures were consisted of (vermicompost, manure, fine gravel and field soil). Leaf cuttings of length 23 cm was taken of clone in November. Results showed that different bed cultures had significant effect on marcotting. In comparison between different treatments, it was observed that rosemary cuttings in vermicompost bed showed the highest percentage of marcotting (%97.33); it has a significant difference with other treatments. Fine gravel, soil field and manure from the farm's impact on marcotting of rosemary cutting were not significant and an average percentage of marcotting in these nursery bed.

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**COMPARATIVE STUDIES ON PHOSPHOMOLYBDENUM ASSAY,
DPPH AND REDUCING POWER ANTIOXIDANT PROPERTIES IN
MICROSHOOTS OF FIVE PERSIAN WALNUTS**

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The present study was aimed to evaluate the comparative studies on *in vitro* antioxidant activity of five micropropagated axillary shoots (microshoots) of the walnut (*Juglans regia* L.) cultivars ‘Chandler’, ‘Howard’, ‘Kerman’, ‘Sunland’, and ‘Z₆₃’. The antioxidant activity was assessed using three models: the phosphomolybdenum assay (PPM), reducing power assay, and 2, 2- diphenyl-1-picrylhydrazyl-scavenging effect (DPPH) [1]. In all assays, the highest antioxidant activity was in microshoot extracts of ‘Kerman’ followed with ‘Sunland’. Walnut microshoots showed reducing powers at very low concentrations (less than 1 mg ml⁻¹) that are in accordance with the results of Pereira et al. [2]. Results of DPPH scavenging of these walnut microshoots appeared to be concentration-dependent and increased with the increasing concentration of each extract. These results showed that with regard to standard antioxidant compounds, antioxidant activities of microshoots are high. Shoots and leaves of walnut contain considerable amounts of active components such as polyphenols, flavonoids, proanthocyanidins and tannins which are considered as potent scavengers of free radicals and reactive oxygen species. The present research program underlies that Persian walnut microshoots are as potential sources of natural antioxidants for medicinal and commercial uses and can be used as an easily accessible source of natural bioactive compounds.

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**THE EFFECTS OF SALINITY ON SOLUBLE SUGARS AND PROLIN IN
THE MEDICINAL PLANT *BORAGO OFFICINALIS* L. ON THE
HYDROPONIC CONDITIONS**

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The salinity of water and soil decreases the growth and yield of agricultural. Salinity affects many physiological and morphological processes of plant by influencing soil solution osmotic potential and ion absorption and accumulation of minerals. To evaluate the effect of salinity on soluble sugars and prolin of medicinal plant of *Borago officinalis*, an experiment was carried out sodium chloride and sulfate sodium salinity with volume ratio 2:1 and density 100mM on *Borago officinalis* was applied in stages 4 leaves. During salinity treatment, contents of proline and soluble sugars were measured regularly. Based on results, the contents of proline and soluble sugars increased significantly. It was concluded that *Borago* was able to resist against stress due to increase contents of these compounds under salinity. Results also suggest that the plant resists against salinity through osmotic adjustment and ion absorption and sharing within its cells. This process is essential for the survival of plants in saline conditions.

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**THE EFFECTS OF SALINITY ON CHLOROPHYLL CONTENT AND
GROWTH OF *BORAGO OFFICINALIS* L.**

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Salinity is one of the most important factors that limit plant growth production in the whole world. Identification of salt tolerant cultivars and improving tolerance of plants is the most effective method for increasing yield. To evaluate the response of growth and pigments contents in *borago officinalis* to salinity under hydroponic conditions was conducted. Sodium chloride and sulfate sodium salinity with volume ratio 2:1 and density 100 mM on *borago* was applied in stages 4 leaves. Dry weight of shoots and roots, wet weight of shoots and roots, chlorophyll contents studied in the leaves, the results showed, these parameters reduced in during salinity conditions, but salinity had no significant effect on chlorophyll contents, there was a significant trend in decreasing fresh weight of shoots. So it could be concluded that in *borago officinalis*.L. plant, one of most important factors for salinity tolerance could be unimpairing the main photosynthetic pigments.

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**INTRODUCTION OF MEDICINAL PLANTS IN THE UPPER GIYAN
REGION IN TAFRESH AREA**

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The Upper neck Giyan region with 911 hectares is placed about 140 Km of the Arak city and 5Km Southeast of Tafresh city. Theirs geographical position is 50° 4' 47/1" – 50° 7' 18/6" North latitude and 34° 07' 19/7" - 34° 39' 29/9" eastern longitude. The altitude of study area is through 2540 to 3065M. The amount of annual precipitation of the area is 277.3 mm and mean annual temperature is 12 °C. The aim of this research was to identify the plant species, the view of area is Cold mountainous. This investigation was done for collection and determination of medicinal plants of The Upper Giyan region in Tafresh area. By regard to source, aware and informed persons and visible observations were determined 76 medicinal species and were noted some of information as: Persian or local, scientific and family name, Vegetative form. This medicinal plants belonged to 59 genus and 23 families, that the most species were in Compositae (12 species), Labiatae (11 species) and Papilionaceae (8 species) families and 6 species of them were endemic of Iran. The flora of area belonged to Irano – Turanianregion.



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**COMPARATIVE STUDY OF ANTI-INFLAMMATORY EFFECTS
OF *RUBIA TINCTORUM* L. EXTRACTS IN CARRAGEENAN-INDUCED
PAW EDEMA IN RATS**

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Inflammation is dynamic processes that are elicited in response to various harmful phenomenons that may threaten the well-being of the host. Herbs have been traditionally used as anti-inflammatory since very early times on account of their biological active constituents. The Rubiaceae in particular has attracted a great deal of interest for the inflammation treatment. The root of *Rubiatinctorum* (Rubiaceae) was collected from Yazd province, in the center of Iran. The root extracts of the plant was studied for their anti-inflammatory activity by using carrageenan-induced hind paw edema in wistar male rats. Indomethacin and normal saline were used as positive and negative controls, respectively. Different concentrations of aqueous, ethanolic, and 50% eq. ethanolic extracts (600, 800, 1000mg/kg) were given orally before carrageenan injection. The paw thickness was measured at 1,3 and 5 hours after injection. Both, aqueous and 50% eq. ethanolic extracts reduced paw edema at 600 and 800 mg/kg concentrations. Moreover, ethanolic extract showed significant effect only at 1h after carrageenan injection. The results indicated that the aqueous extract were exhibited higher anti-inflammatory effect compared with other extracts. Accordingly, the potent anti-inflammatory effect of the root extracts attributed to the polar compounds which extracted in the water.



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**EFFECT OF MICROWAVE RADIATION ON SEED
GERMINATION AND SEEDLING GROWTH OF THYME**

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Thyme (*Thymus vulgaris L.*) is a plant of Lamiaceae that use in ancient medicine and have many medicinal attribute like: carminative, anti septic and disinfectant .because there are a little study about effect of microwave radiation on seed germination of thyme, in this study was investigated the effect of microwave radiation on seed germination and seedling growth of Thyme. For this aim thyme seeds were affected by LG model microwave set, with 2450MZ and two power,180 watt and 360 watt ,and with 4 time: 30, 60, 90 and 120 second. This assay did as factorial in randomize design and with 3 repetitions in every treatment .20 seeds after disinfectant were put in every petri dishes that were receptacle gloss paper in 3 repetitions. Petri dishes were put in germinator with $25\pm 1^{\circ}\text{C}$, 70% moisture and 8 hours lighting. Germinated seeds were counted and were recorded every day until twelfth day. Then were measurement germination parameters after 12 days and were compared with together and with control sample. Results show that treatment of 180watt, 60 second increase total length, total weight, and germination speed index and seedling stamina index .so treatment of 180watt, 30 second increase germination percent and germination index. Microwave radiation increase germination parameters in limit range as increase in set power or treatment time, decrease parameters extents. Because, this method is very cheap, with use of it may increase thyme production in commercial level.

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EFFECT OF B VITAMINS ON GERMINATION FACTORS OF FENNEL

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Fennel (*Foeniculum vulgare*) is a plant of *Apiaceae* and is one of the many valuable medicinal plants that have many health benefits. In this study was considered vitamins B effect on germination factors of fennel. For this aim fennel seeds were treatment with four types of vitamins belong to B group, (B1, B3, B6, and B9). This assay did as factorial in randomize design and with 3 repetition in every treatment. 40 seeds were put in every petri dish. Then seeds were treatment with 300 ppm of every vitamin. Control was considered distilled water. Petri dishes were put in germinator, and it was programmed with 2 cycles. First, 16 hours darkness, 70% moisture and 20°C and second, 8 hours lighting, 65% moisture and 25°C. Germinated seeds were counted and were recorded every day. Then were measurement germination factors after 12 days. Data statistic analysis show that, vitamin B9 increase speed germination, germination index, vigor seed, shoot length, root length. Whereas vitamin B1 increase fresh weight and between samples, there was not any significant difference in terms of dry weight. Since vitamins B9 and B1 increase fennel germination parameters, may this method can be used as a way to mass production of this plant.

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**INTRODUCTION OF MEDICINAL PLANTS OF ASHTIAN MOUNTAIN
PROTECTED AREA**

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The Ashtian mountain protected area is located in north of Ashtian city Province. The view of area is Cold mountainous. Altitude domain of area is between 2300 to 3020m. The average annual rainfall is about 310 mm. The average maximum temperature is 26/2oc in August and minimum temperature is -30°C in January. This investigation was done for collection and determination of medicinal plants of Ashtian Mountain protected area. By regard to source, aware and informed persons and visible observations were determined 88 medicinal species and were noted some of information as: Persian or local, scientific and family name, Vegetative form. This medicinal plants belonged to 64 genus and 27 families, that the most species were in Compositae (14 species), Labiatae (13species) and Papilionaceae (10 species) families. The flora of area belonged to Irano – Turanianregion.



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**EFFECT OF NA CL AND GIBBERELIC ACID ON SEED
GERMINATION AND SEEDLING GROWTH OF
5 MEDICINAL PLANTS**

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The effect of sodium chloride (NaCl) and gibberillic acid (GA₃) on seed germination and seedling growth of 5 medicinal plants was studied under controlled conditions. For this various aqueous solutions of NaCl (0.05, 0.5 and 1.5 mol/l NaCl) and GA₃ (100, 200 and 300 ppm GA₃) were used solely or combined as germination and growth substrates. Two of the aqueous solutions of NaCl (0.5 and 1.5 mol/l NaCl) negatively affected seed germination of all 5 species even when combined with GA₃. Seeds of the 5 medicinal plants germinated regularly when a 0.05 mol/l NaCl aqueous solution was used alone or combined with the various levels of GA₃. One NaCl aqueous solution (0.5 mol/l) impeded germination of dill, peppermint, coriander and thyme seeds; whereas it increases germination percentage and germination speed of dragonhead. GA₃ solution significantly increased seed germination percentage, seed germination speed, and seedling length in all plants except thyme. Combined uses of GA₃ with NaCl reduce the negative effect of NaCl in lot of measured factors.

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**INVESTIGATION OF MEDICINAL PLANT CONSUMPTION IN
KHORRAM ABAD TOWNSHIP VIEWPOINT HERBAL GROCERY**

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To be informed form medicinal plants consumption and production in an area caused by better programming and arranging for support herbal grocery. This study was conducted investigation of medicinal plants consumption viewpoint herbal grocery. Data was collected in 2012 based on field and library studies by using questionnaire which involved descriptive and four-selecting. Samples were all of the medicinal plant groceries in Khorram Abad Township. Twenty herbal groceries were selected from different regional of the township as complete randomizing. Reliability and stability analysis tested by using Cronbach's alpha and in this regurd result was acceptable. Descriptive results show that medium age of herbal grocery was 38.55 years. All of the herbal groceries were educated. The most precedence of the person was between 1 to 5 years. Also result show that 95% the person have enough information about properties of medicinal plants. Sources of medicinal plants were 55% out of Lorestan province. The most consumers were female with 70% abundance. Analytical analysis results show that there is reverse and direct relationship between precedence of the persons and satisfaction of income deal. Also there is direct and positive relationship between deal of sale and selling precedence. The most sale form was dry herb at 95% level of statistical namely borage, matricari and chicory were the most and the lowest were milfoil, deisy and tarragon respectively. Also in spices plants, turmeric, black paper and cinnamon were the most and the lowest were nutmeg, sumac and clove respectively.

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**EFFECT OF DIFFERENT LEVELS OF IRRIGATION AND PLANT
GROWTH PROMOTING RHIZOBACTERIA ON GRAIN YIELD AND
ROOT CHANG OF CHAMOMILE (*MATRICARIA RECUTITA* L.)**

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In order to study effect of drought stress and Plant Growth Promoting Rhizobacteria (PGPR) on yield and yield components of chamomile (*Matricaria recutita*) an experiment was conducted base on split factorial in randomized complete block design with three replications in Ilam in 2009- 2010 growing season. Irrigation as main plot, chemical fertilizer (nitrogen and phosphor) and Growth Promoting Rhizobacteria (*Azotobacter*, *Pseudomonas* and *AZ+Ps*) as sub plot. The results showed that drought stress was affected on grain yield, 1000-grain weight, biological yield and harvest index, root length, root density and root weight. The highest grain yield, 1000-grain weigh, biological yield, harvest index, root density and root weight were obtained from full irrigation. Drought stress at all stage increased root length .Drought stress at grain filling stage reduced 1000-grain weight. PGPR had different significant on grain yield head per plant, 1000-grains weight, biological yield, root length, root density and root weight. *AZ+Ps* had the highest grain yield, root length, root density and root weight.



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**EFFECT OF BIO-FERTILIZER ON GERMINATION AND SEEDLING
OF CHAMOMIL (*MATRICARIA RECUTITA* L.) CULTIVARS**

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In order to investigate the effect of bio-fertilizer on germination and seedling growth of chamomile cultivars, an experiment was conducted based factorial in randomized complete block design with three replications in western of Iran in 2009-2010 cropping season. The Experimental factors included of bio-fertilizer (*Rezobacterin*, *Azotobacter* and *Azospirillum*) and chamomile cultivars (Bona, Goral and Jermania). In these research traits as: root length, stem length, root length/root dry weight ratio, total dry weight of colonization. Results of variance of analysis showed that bio-fertilizer had significant affected on root length, root length/root dry weight ratio. Using from bio-fertilizer caused increasing of root length, root length/ root dry weight ratio. *Azotobacter* had significant affect on traits to strains. Bona cultivar had the highest root length, root length/root dry weight ratio to cultivar.



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ANTIMICROBIAL EFFECTS OF ALCOHOL EXTRACT OF *CURCUMA LONGA* L. ON THE SOME OF BACTERIA

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Turmeric (*Curcuma longa* Linn.) is a plant of the family Ziniberaceae. It is native to the Near East. Turmeric is a rich source of phenolic compounds or curcuminoids that have documented anti-oxidant, antiparasitic. In this study the antibacterial effects of alcohol extract from rhizome of *Curcuma longa* was against *E. coli*, *P. aeruginosa*, *St. aureus*. Tested bacteria are *E. coli* (ATCC 25922), *St. aureus* (ATCC 25923), *P. aeruginosa* (ATCC 27853). Plants were treated in triplicate with four different concentrations of extracts of (*Curcuma longa*) 7,9,11,13 mg/ml. Dried rhizome powder of *Curcuma longa* was mixed by methanol and water after filtering, it placed oven 50^c for 24h. Anti-bacterial activity of different concentration of extract was examined with agar dilution method in nutrient agar. The results showed that influenced significantly (p<0.05) growth of *E. coli* and *P. aeruginosa* was inhibited at the concentration 11mg/ml and *St. aureus* was inhibited at the concentration 7mg/ml. Therefore Turmeric can prevent many gastrointestinal infection and food poisoning with bacteria such as *E. coli* and *St. aureus*.

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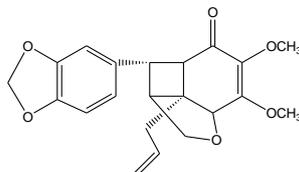


ANTIOXIDATIVE, ANTIMICROBIAL AND CYTOTOXIC ACTIVITIES
OF KUNSTLERONE FROM BEILSCHMIEDIA SPECIES

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A new neolignan [1], 3, 4-dimethoxy-3',4'-methylenedioxy-2,9-epoxy-6,7-cyclo- 1, 8-neolign-11-en-5(5H)-one, named (+)-kunstlerone from the leaf was isolated from *Beilschmiedia kunstleri* Gamble [2]. The structure was established through various spectroscopic methods notably 1D- and 2D-NMR, UV, IR and LCMS-IT-TOF [3]. (+)- kunstlerone showed mild cytotoxicity against various cancer cell lines; A549, PC-3, A375, HT-29 and WRL-68, respectively with different EC₅₀ value 28.02, 26.78, 33.78, 33.65 and 16.46 µg/mL. These results indicate that cell lines differ in their sensitivity to the same test agent, which may be determined by multiple cell type-specific signalling cascades and transcription factor activities. (+)- kunstlerone also showed a strong antioxidant activity with an SC₅₀ of 20.0 µg/ml. Antimicrobial activity of the extracts and isolates were investigated using the agar dilution method. We have provided the experimental data to sustain the make use of *Beilschmiedia kunstleri* Gamble as an herbal medicine from Lauraceae family.



Structure of (+)-kunstlerone

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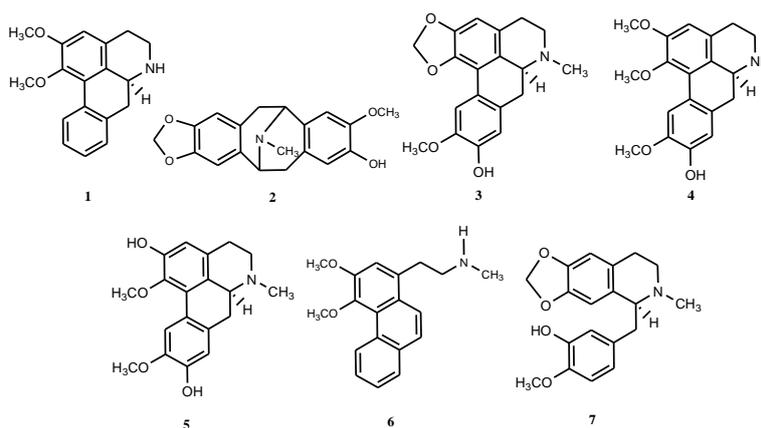
ALKALOIDAL COMPOUNDS FROM BARK OF BEILSCHMIEDIA

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Malaysia is well-known as the richest and the oldest rain forest in the world. Lauraceae family consists of 35 genera and 2500 species all over the warmer parts of the world at the same time as in Malaysia it comprises in relation to 16 genera and 213 species [1]. *Beilschmiedia* species are known to produce several types of alkaloids as biologically compounds such as isoquinoline, quinoline and indole that have been reported to demonstrate. *Beilschmiedia kunstleri* was collected from Temau Sungai Tekam Reserved Forest. The dried and ground bark of *B. kunstleri* was extracted first with hexane followed by dichloromethane. The dichloromethane extract was evaporated to 500 mL followed by an acid-base extraction to give the crude alkaloid. The alkaloids were separated using column chromatography over silica gel using CH₂Cl₂ gradually enriched with methanol as solvent. The structural elucidation of the alkaloid has been carried out using spectroscopic techniques such as UV, IR, OR, CD, MS, ¹H- & ¹³C-NMR and 2D-NMR.

I have performed a phytochemical investigation on the bark of a Malaysian Lauraceae, *Beilschmiedia kunstleri* Gamble, which has led to the isolation of seven known alkaloids: (+)-nornuciferine (**1**), (-)-isocaryachine (**2**), (+)-cassythicine (**3**), (+)-laurotetanine (**4**), (+)-boldine (**5**), noratherosperminine (**6**) and (+)-N-dimethylphyllocaryptine (**7**) [2]. Chemical structural study on the bark of this species has afforded various types of alkaloids.



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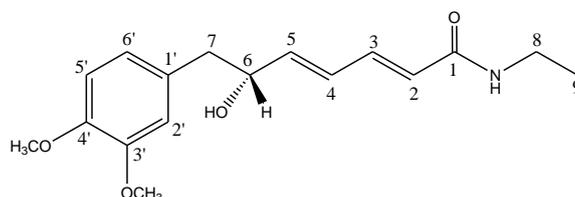


BIOACTIVITIES OF KUNSTLERAMIDE AS A DIENAMIDE FROM LAURACEAE FAMILY

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In continuation of my research on the medicinal plants from Malaysian flora [1–3], I have performed a phytochemical investigation on the bark of a Malaysian Lauraceae, *Beilschmiedia kunstleri* Gamble [4], which has led to the isolation of a new dienamide. This dienamide, (2*E*, 4*E*)-7-(3',4'-dimethoxyphenyl)-*N*-ethyl-6-(*R*)-hydroxyhepta-2,4-dienamide, named (-)-kunstleramide, was isolated from the bark of *Beilschmiedia kunstleri* Gamble. That structure was established from spectroscopic techniques, most notably 1D- and 2D-NMR, UV, IR, OR, circular dichroism (CD) spectra and LCMS-IT-TOF [5]. (-)-Kunstleramide exhibited very poor dose-dependent inhibition of DPPH activity, with an IC₅₀ value of 179.5 ± 4.4 µg/mL, but showed a moderate cytotoxic effect on MTT assays of A375, A549, HT-29, PC-3 and WRL-68 with EC₅₀ values of 64.65, 44.74, 55.94, 73.87 and 70.95 µg/mL, respectively.



Structure of (-)-kunstleramide

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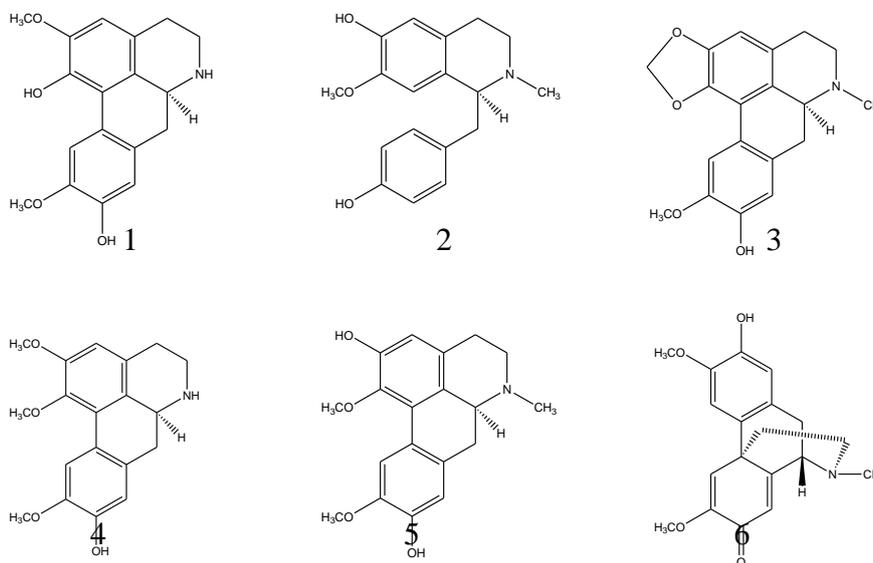


ALKALOIDAL NATURAL PRODUCTS IN THE LEAF OF MALAYSIAN
BEILSCHMIEDIA

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Six known alkaloids: (+) -norboldine (**1**), (+)- *N*-methylisococlaurine (**2**), (+)-cassythicine (**3**), (+)- laurotetanine (**4**), (+)- boldine (**5**) and (-)- pallidine (**6**) from the leaves isolated from *Beilschmiedia kunstleri* [1, 2]. The structures were established through various spectroscopic methods notably 1D- and 2D-NMR, UV, IR and LCMS-IT-TOF [3].



Structures of alkaloids of leaves (**1-6**)

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**IDENTIFICATION OF AGRONOMIC TRAITS INFLUENCING SEED
YIELD OF SOME IRANIAN FENUGREEK (*TRIGONELLA
FOENUMGRAECUM L*) ECOTYPES**

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Fenugreek (*Trigonella foenum-graecum L.*) is one of the oldest known medicinal plants. In order to evaluating the phenotypic diversity and seed yield of fenugreek ecotypes, six fenugreek ecotypes collected from the main cultivation areas of Iran. Six ecotypes were evaluated based on randomized complete block design (RCBD) with six replication, using normally irrigation (once a week). The Results of the combined analysis of variance and mean comparison showed significant differences among fenugreek ecotypes for all the traits. Correlation coefficients showed, number of seeds per plant, number of seeds per pod and plant height had the higher correlation with seed yield. The regression analysis showed the number of seeds per plant, 100 seed weight and number of seeds per pod had the highest effect on the seed yield. Based on path analysis results, the number of seeds per plant and 100 seed weight had the higher positive direct effects on seed yield per plant. The factor analysis revealed that two factors explained more than 78% of the total variation. Ultimately, with cluster analysis, fenugreek ecotypes were arranged in two independently groups. Based on results, significant variation was observed, in fenugreek ecotypes. The number of seeds per plant, number of seeds per pod and 100 seed weight had the highest effects on seed yield, which can be recommended as useful traits in breeding programs of fenugreek.

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**THE EFFECT OF SALINITY STRESS ON GERMINATION IN
DRACOCEPHALUM MOLDAVICA SEEDS**

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In attention to medicinal plants' value in one hand and the salinity of water and soil in other hand, this problem increasingly grows in the world and encompasses a great scope of our country. Therefore an experiment was done for evaluation the salinity effect on (*Dracocephalum moldavica*) as a medicinal plant in a full randomly manner with four replications. The salinity stress was include seven levels (0, 50, 100, 150, 200, 250 and 300 mmolar of NaCl). The results showed that by increasing the salinity stress, the length and dry weight of radicle and stem decrease. Therefore the response of (*Dracocephalum moldavica*) to salinity levels in budding stage was favorite [1-4].

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STUDY OF GENETIC DIVERSITY IN PERSIAN SHALLOT (*ALLIUM HIRTIFOLIUM*) BASED ON MORPHOLOGICAL TRAITS

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Iran is limited countries with an extended range climate and therefore with a very diverse of plant landraces. In this study, 16 ecotypes of Persian shallot were collected from Lorestan province and evaluated to determine the diversity among them. The studied morphological characters were: Bulb weight (g/m^2), number of bulb, plant height (cm), bulb diameter (mm), leaf length (cm) and leaf width (cm). Duncan's multiple range tests showed that the ecotypes of Persian shallot were significantly different in all evaluated parameters except bulb diameter and leaf length. Correlation coefficients showed that bulb weight was positively correlated with number of bulb ($r=0.474$) and bulb diameter ($r=0.624$), which is useful for indirect selection of ecotypes with high number of bulb and bulb diameter and therefore high amount bulb weight. Cluster and principal component analyses based on six morphological traits separated ecotypes into the four main groups, but did not indicate significant relationship between genetic diversity and geographical origins.

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AMOUNT OF MICRO AND MACRO ELEMENTS IN LEAVES OF
MEDICINAL PLANT *CALENDULA OFFICINALIS* L. WITH FOLIAR
APPLICATION OF BIO-STIMULATORS

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Calendula officinalis L. from Compositae family as an important medicinal plant is used in Homeopathic methods and treatment of scalds and skin illnesses. This investigation is planned for the desirable effect of Amino Acid compounds foliar application on bio-parameters of plants. The experiment with completely randomized blocks design was conducted in 10 treatments with 3 replicates in 1390. Treatments of experiment included amino acid compounds with commercial formulation of Aminolforte, Kadostim, Fosnutren, Humiforte (0.75 and 1.5 L.ha⁻¹) and chemical fertilizer NPK (70 kg.ha⁻¹ before sowing) and control treatment (without foliar application). Results showed that effect of these treatments was significant (P<0.01) on 8 parameters in a way that the most amount of P element (1.11 mg/g DW), K (2.13 mg/g DW) with treatment of Kadostim 1.5 L.ha⁻¹, N (2.07%), Cu (0.24 mg/g DW), Mn (2.26 mg/g DW) with treatment of Fosnutren 1.5 L.ha⁻¹, Zn (0.58 mg/g DW) with treatment of Aminolforte 1.5 L.ha⁻¹, Fe (2.8 mg/g DW) and Ca (24.5 mg/g DW) with treatment of complete chemical fertilizer was obtained. To obtain the best yield in phytochemical parameters, foliar application of Fosnutren and Kadostim 1.5 L.ha⁻¹ is recommended.

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**THE EFFECTS OF DIFFERENT NITROGEN LEVELS ON YIELD,
YIELD COMPONENTS AND OIL PERCENTAGE OF SPRING
SAFFLOWER CULTIVARS IN KERMAN, IRAN**

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Nitrogen is considered as one of the important nutrient elements at safflower feeding and it has a key function to reach to the potential yield. In order to investigate the effects of different levels of nitrogen rates on yield and yield components of 5 safflower cultivars, an experiment was conducted in Research farm of Kerman. The experiment was carried out using split plot design in randomized complete block with three replications. Nitrogen rates (Urea) were arranged as main plots in 4 levels (0, 50, 75 and 100 kg/ha) and 5 safflower cultivars (local varieties belong to Isfahan, Rayen and Kerman and bred cultivars of IL and PI) as sub plots. Traits of yield and yield components and oil percentages, dry weight, seed and nitrogen harvest index, were investigated. Physiologic efficiency, appearance output efficiency and nitrogen use efficiency were also determined. Results showed that higher seed yield and oil percentage obtained from 75 kg nitrogen/ha. Higher seed yield belongs to Isfahan and PI cultivars. With increasing nitrogen, physiologic efficiency, appearance output efficiency and nitrogen use efficiency were significantly decreased.

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**ANTIMICROBIAL ACTIVITY OF LAVANDULA ANGUSTIFOLIA Mill.
ESSENTIAL OIL**

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Lavandula angustifolia Mill., (*Labiatae*) aerial parts essential oil was extracted by hydrodistillation method. GC and GC-MS analysis of essential oil showed the presence of 1,8-cineole (34.8%), borneol (24.6%), camphor (10.4%) as the main components. The antimicrobial evaluation by disc diffusion and microbroth dilution against *S. aureus*, *S. saprophyticus*, *B. cereus*, *E. coli*, *S. typhimurium*, *C. albicans*, *A. niger* exhibited that *B. cereus* (IZ=18.4 mm, MIC and MLC= 2,4 µl/ml), *S. aureus* (IZ=14.9 mm, MIC and MLC= 2,2 µl/ml), *S. saprophyticus* (IZ=13.0 mm, MIC and MLC= 2,4 µl/ml) were susceptible microorganisms, while *C. albicans* (IZ=10.5 mm, MIC and MLC= 8,16 µl/ml), gram negative bacteria (IZ=7.0-8.0 mm, MIC and MLC= 2-8; 4-8 µl/ml) and *A. niger* (IZ=7.0 mm, MIC and MLC= 16,32 µl/ml) were less sensitive microorganisms than gram positive bacteria.



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**ESSENTIAL OIL COMPOSITION OF “*STACHYS LAXA BOISS.*”
(CASE STUDY: POSHT KOUH OF KIASAR IN MAZANDARAN)**

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Aromatic plants are widely used in pharmacy, food, cosmetics and health. *Stachys Laxa* is a plant of the Lamiaceae family. *Stachys Laxa* plant grows in an area with Mediterranean and semi-arid climate. The studied area is Kiasar County. The goal of this study is to investigate qualitatively and quantitatively constituents of the essential oil of *Stachys Laxa*. The flowerings shoot of this plant was collected from an area of Kiasar County in Mazandaran province in June 2010. The essential oils were identified by using the water distillation method in Clevenger apparatus. The GC and GC/MS were used to determine and investigate constituents of the essential oils. Results show that 31 constituents are identified, in which Germacrene D (12.29%), δ - Cadinene (6.25%), β - Bisabolene (5.68%), Hexadecanoic acid (5.1%), α - Cadinol (4.39%) are found to be the major constituents of the oil. [1, 2]

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**PROTECTIVE EFFECTS OF GREEN TEA ON ANTIOXIDATIVE
BIOMARKERS IN CHEMICAL LABORATORY WORKERS**

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Chemical materials are an environmental contaminant, which is extensively used in laboratories, which may cause various forms of health hazards in laboratory workers. Therefore, this toxicity most likely is a result of the oxidative metabolism of chemical to reactive products. As green tea (GT) possesses antioxidant effects, the objective of this study was to examine any amelioration oxidative stress in chemistry laboratory workers drinking 1 cup (3g/300 ml water) of freshly prepared tea once daily. Baseline characteristics including age, sex, smoking, fruit consumption and duration of exposure were recorded via questionnaire the subjects. Saliva level oxidative stress parameters total antioxidant capacity (TAC), glutathione peroxidase (GPx), catalase (CAT) and superoxide dismutase (SOD) was estimated before and after consumption GT in this workers. Treatment of subjects with GT induced a significant reduction in saliva GPx activity (406.61 ± 22.07 vs 238.96 ± 16.26 U/L $P=0.001$) and induction in TAC (0.46 ± 0.029 $\mu\text{mol/ml}$ vs 0.56 ± 0.031 , $P=0.016$). No statistically significant alteration was found for saliva SOD and CAT (0.080 ± 0.0019 vs 0.079 ± 0.0014 , $p>0.05$), (20.36 ± 0.69 vs 19.78 ± 0.71 , $P>0.05$) (respectively after 28 days treatment by GT. These results demonstrate that drinking GT during chemical exposure can reduce several parameters indicative of oxidative stress. In conclusion, by GT as a dietary supplement, can be a rational protocol to control source of hazards in chemical laboratory workers.



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EFFECT OF IBA AS A ROOT PROMOTING HORMONE AND BIO-FERTILIZERS IN PROPAGATING OF LAVANDULA (*LAVANDULA OFFICINAL*) BY CUTTING

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Lavandula (lavandula officinal) as an evergreen tree has widely developed in tropical, subtropical and temperate area of the world because of its medicinal properties [1]. The cheapest method for propagation of this plant is cuttings, but with some consideration same as special treatments with plant regulators. This experiment was done to evaluate and suggest the best concentration of IBA (Indole-3-Butyric Acid) on root generation of eucalyptus cutting. Simultaneous effects of bio-fertilizers on root formation, moreover, were assessed in this experiment. Considering both aspects of above subject matters, this experiment was done in a factorial experiment based on completely randomized design with two factors (5 levels of IBA including 0, 500, 1000, 2000 and 4000 ppm, and two levels of bio-fertilizer, which includes Barvar2 (brand name) and Nitroxin (brand name) in five replications. Results demonstrated that, level of hormone concentration having increased, root weight, root number and rooting percentage increased alike. Root length; However, has a reverse behavior and showed the highest amount at 500 ppm of hormone concentration. Biological fertilizers only stimulated the number of root characteristic and no effect was observed on the other mentioned traits.

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**SHOOT INITIATION OF BISTORT (*POLYGONUM BISTORTA*)
EXPLANTS UNDER *IN VITRO* CONDITION**

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Introducing a defined protocol to propagate all plant species is not possible because many factors contribute in micro-propagation of plants. The most important factors are plant regulator effects and their interaction with plant species [1]. This experiment, with the aim of *in vitro* shoot initiation of Bistort (*Polygonum bistorta*), was done in a completely randomized design with three replications. Murashige and Skoog basal medium supplemented with BA (0.1, 0.2 and 0.3 mg/lit), KI (1, 2 and 3 mg/lit) or NAA (0.1 and 0.2 mg/lit) plus BA (0.1, 0.2 and 0.3 mg/lit) were twelve treatments which were used in this experiment. Results showed that the highest amount of shoot length (3.64 cm) and leaf number (4) were occurred at 0.1 mg/lit of BA. KI in different concentrations and combination of hormones have also showed significant effects on shoot initiation in comparison to control but well-grown and strong plantlets as it is mentioned previously were produced at lowest amount of BA concentration.

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**ANTIHYPERTENSIVE EFFECT OF CELERY SEED ON RAT BLOOD
PRESSURE IN CHRONIC ADMINISTRATION**

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In this study the effects of different celery (*Apium graveolens*) seed extracts were investigated on blood pressure of normotensive and desoxycorticosterone acetate-induced hypertensive rats. The hexanic, methanolic and aqueous-ethanolic extracts were administered intraperitoneally and their effects on blood pressure (BP) and heart rate (HR) were evaluated in comparison with spironolactone as a diuretic and positive control. Also, the amount of *n*-butylphthalide (NBP), as an antihypertensive constituent, in each extract was determined by HPLC. The results indicated that all extracts reduced the BP and increased the HR in hypertensive rats while had no effect on normotensive groups. The data showed that administration of 300 mg/kg of hexanic, methanolic and aqueous-ethanolic (80 / 20, v/v) extracts of celery seed caused 38, 24 and 23 mm Hg reduction in BP and 60, 25 and 27 beat per minutes increase in HR, respectively. Also the HPLC analysis data revealed that the content of NBP in hexanic extract was 3.7 and 4 times more than methanolic and aqueous-ethanolic extracts. It can be concluded that the celery seed has antihypertensive properties which appears to be attributable to the actions of its active hydrophobic constituents such as NBP and can be considered as an antihypertensive agent in chronic treatment of elevated blood pressure.

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INVESTIGATION OF SALICYLIC ACID AND KINETIN EFFECTS ON SEED GERMINATION AND SEEDLING GROWTH OF LEMON BALM (*MELISSA OFFICINALIS L.*) UNDER SALINITY STRESS

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In order to investigation of relationship between effects on germination parameters and seedling growth of wheat (*Melissa officinalis L.*) under salinity stress, we conducted a factorial experiment design with 4 levels of salicylic acid (0, 1.5, 3 & 4.5 mg lit⁻¹) and Kinetin (0, 1, 2 & 4 mg lit⁻¹) at 4 levels of salinity that prepared by 0, 50,100 & 200 mMole NaCl. This study applied in factorial experiment and full randomize block template in three repeat. ANOVA of studied traits at germination and seedling growth phases showed that germination percentage, seed germination and seedling growth rate, root and shoot length decreased dramatically by increasing of salinity. Increasing of exogenous salicylic acid concentration led to increasing of shoot length and water tissue content at different levels of salinity but it had an inhibitory effect on germination rate. The high concentration of Kinetin (mg lit⁻¹) led to increasing of shot length and shoot/root ratio seriously. There were interaction between salicylic acid and Kinetin in related to seedling growth parameters at salinity levels. Salicylic acid and Kinetin treating increased seedling water content. Se of this experiment results and development of researches in related to exogenous application of plant growth regulators can be lead to better understanding about physiological mechanisms of plant tolerance to environmental stresses.

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INVESTIGATION THE AMONUT OF FIBER AND PHENOLIC
COMPOUNDS IN *SCLERORHACHIS LEPTOCLADA* FROM
SOUTH KHORASAN

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Diabetes is a chronic disorder of carbohydrate, fat and protein metabolism characterized by fasting elevations of blood sugar levels. Studies show diabetes to be one of the diseases most clearly related to inadequate dietary water-soluble forms of fiber intake, such as hemicelluloses and mucilage. These types of fibers slowing down the digestion and absorption of carbohydrates, thereby preventing rapid rises in blood sugar, increasing the sensitivity of tissues to insulin, thereby preventing the excessive secretion of insulin; and improving uptake of glucose by the liver and other tissues, thereby preventing a sustained elevation of blood sugar level. Plants likes legumes (beans), oat bran, nuts, seeds, psyllium seed, husks, pears, apples, and most vegetables and herbs are sources of water-soluble fibers.

In this research phenolic compounds and fiber (NDF: neutral detergent fiber & ADF: acid detergent fiber) constituents of *S. leptoclada* are investigated. The study showed that *S. leptoclada* contains nutritious compounds such as phenolic compounds, fibers and proteins which are important in diabetes dietary. The results are shown that *S. leptoclada* contain 46.74% ADF and 66.99% NDF in stem and 23.82% ADF and 33.39% NDF in flower and also 20. 18% protein Amount. The results phenolic compounds are shown in below table1. The values of fibers, protein and phenolic compounds reflect a desirable nutritional importance of *S. leptoclada*.

Table1: The phenolic costituent of schlerorachis leptoclada(mg extractor/g dry plant)

Solvents	Extractor	
	ethanol	ethyl acetate
The values of phenolic compounds (mg/g)	3.45	0.85

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**THE EFFECT OF DIFFERENT SUPER ABSORBENT POLYMER AND
DROUGHT STRESS ON GRAIN YIELD AND ESSENTIAL OIL OF
CHAMOMILE**

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In order to investigate the effect of different super absorbent polymer and drought stress levels on grain yield and essential oil of chamomile, an experiment was conducted based factorial in randomized complete block design with three replications in western of Iran in 2010-2011 cropping season. The Experimental factors included of irrigation (60, 120 and 180 mm evaporation from class A pan) and super absorbent polymer (0, 70, 140 and 210 kg/ha). Results showed that irrigation had affected on grain yield, harvest index, biological yield and essential oil. The highest and the lowest grain yield, biological yield and essential oil obtained 60 and 180 mm evaporation from class A pan, respectively. 140 kg/ha super absorbent polymer had the highest grain yield, harvest index, biological yield and essential oil.



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THE EFFECT OF STRAINS OF *PSEUDOMONAS* ON GROWTH AND DEVELOPMENT OF ROOT IN THYME (*THYMUS VULGARIS* L.)

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Pseudomona is one of the diazotroph microorganisms which have been isolated from the rhizosphere of grasses in both tropical and temperate regions. In the last few years there have been several reports, including different results as regards significant increases in medicinal plant growth when applying of this bacterium. This experiment was conducted in the Ilam, Iran in 2008-2009. In this experiment Thyme (*Thymus vulgaris* L.) seeds were inoculated with *Pseudomona* strains (*fluorescence* and *putidas*) with 10^1 up to 10^9 cfu/ml then root length, dry weight and number of root branches, being measured. Inoculations of 10^8 to 10^9 cfu/ml of strains, inoculation with *putidas* strain exhibited more positive effect on root in, but *fluorescence* strain most root growth.



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**ISOLATION, STRUCTURAL CHARACTERIZATION AND
ANTIOXIDANT ACTIVITY OF A NEW WATER-SOLUBLE
POLYSACCHARIDE FROM *ACANTHOPHYLLUM SQUARROSUM*
ROOTS**

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ASPS-1, a new water-soluble polysaccharide with molecular weight of 29 kDa and a specific optical rotation of $+180^\circ$ (c 1.0, H₂O), was extracted from the roots of *Acanthophyllum squarrosum* by warm water and further successively purified through DEAE-Cellulose A52 and Sephadex G-100 columns. Monosaccharide analysis revealed that the ASPS-1 was composed of Glc, Gal and Ara with a relative molar ratio of 1.8:4.2:1.0. Its structural features were elucidated by a combination of FT-IR, methylation and GC-MS analysis; periodate oxidation and Smith degradation, partial acid hydrolysis and ¹³C and ¹H NMR spectroscopy. The data obtained indicate that ASPS-1 possessed a backbone of α -(1→6)-linked Gal with branches attached to O-2 by α -1→linked Glc and at O-3 by α -1→linked Gal and by α -(1→3)-linked Ara. The in-vitro antioxidant activity showed that ASPS-1 possesses DPPH radical-scavenging activity in a concentration-dependent manner with an EC₅₀ value of 3.8 mg/ml.

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**THE STUDY OF POLYPHENOLS PROFILES, CARBOHYDRATES
CONTENT AND ANTIOXIDANT CAPACITIES IN
SOPHORA PACHYCARPA C. A. MEY**

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Sophora pachycarpa with native name "Talkhak" a member of Leguminosae family is an adaptable plant of central sandy areas of Iran. To study the phytochemical characterization in *sophora pachycarpa*, the polyphenols profiles (total phenolics, flavonoids and tannin), carbohydrates content and antioxidant capacities of the leaves, roots and seeds of plant were determined. Briefly, to determine of polyphenols profiles, tissues were extracted with different solvents (Et₂O, CHCl₃, EtOAc, *n*-BuOH, and H₂O). The amount of total phenolic content of each extract was measured spectrophotometrically using the Folin-Ciocalteu (FC) reagent according to a laboratory procedure described by Fukumoto et al. with small modifications using gallic acid as standard [1]. Also, total flavonoid content in the extracts was determined using slightly modified colourimetric method described by Jia et al. based on the formation of flavonoid-aluminum complex [2]. Hence, total tannins were measured according to the method in Makkar et al. with modifications [3]. To evaluate the antiradical and antioxidant abilities of the acetonic extract of tissues, DPPH radical scavenging assay was employed. Furthermore, the concentration of water soluble carbohydrate was measured spectrophotometrically using the Anthrone and Glucose reagents according to a method that described by Deriaz 1961.

The results showed that the highest amount of phenolic compounds and flavonoids existed in H₂O extract of leaf. The Et₂O extract of root has also been observed the highest amount of tannin. The lowest quantity of phenolic compounds, flavonoids and tannins were found in the CHCl₃, *n*-BuOH and CHCl₃ extracts of leaf, respectively. Also, the highest concentration of carbohydrate was existed in root.

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EVALUATION OF NUTRIENT CONTENT (CRUDE PROTEIN, FAT CONTENT, CRUDE FIBER, NEUTRAL DETERGENT FIBER AND ACID DETERGENT FIBER) AND HEAVY METALS IN *SOPHORA PACHYCARPA* C. A. MEY

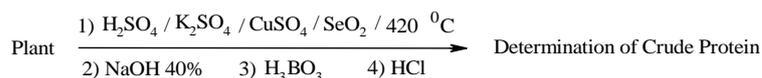
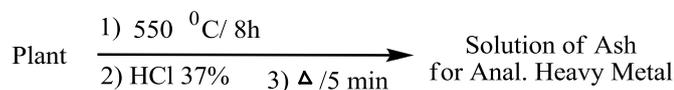
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Understanding the nutrient content of a plant body will be a useful way for determining rangeland capacity, the most proper time of utilization of range plants, prediction of malnutrition and evaluation of nutrition requirements of plants [1]. *Sophora pachycarpa* with native name "Talkhak", a member of Leguminosae family, is an adaptable plant of central sandy areas of Iran. In this study, we evaluated Talkhak's properties including Crude Fiber (CF), Crude Protein (CP) using Kjeldahl (1965) method, Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF) according to a laboratory procedure described by Goering and Van Soest (1970), Fat Content(FC), and heavy metals such as Ag, As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Se and Zn according to the method of Korouri et al. (1982).



The results showed that a higher content of elements in the leaf compared to the root and seed. The leaves are rich in Fe, Mg and Mn, whereas the quantity of Fe and Mg are considerable in the root. The amount of CP in seed was higher than leaf and root. Furthermore, leaves are rich in FC and CF. Also, NDF and ADF have higher quantity in the root compared to the leaf and seed.

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**EFFECTS OF MULCHING ON QUANTITY AND QUALITY YIELD OF
GARLIC POPULATIONS (*ALLIUM SATIVUM* L.)**

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In Khuzestan province, weed, soil crusting, low soil temperature in winter, low precipitation and lack of soil nutrient decrease garlic yields. In order to study the effect of mulching on four garlic populations an experiment was conducted as a factorial experiment in randomized complete block design (RCBD) with three replication in the medicinal plant farm of the Ramin Agriculture and Natural Resources University in 2010-2011. Experimental factors included; mulching system in four levels (wheat straw, cow dung, black polyethylene and no mulching (control)) along with four Iranian garlic population (Dezful, Ramhormoz, Baghmalek and Hamedan). Plant fresh weight, shoot dry matter, bulb weight, cloves number per bulb, chlorophyll index (SPAD), bulb protein and yield were evaluated. The results show that mulching system had significant effect ($P \leq 0.5\%$) on plant fresh weight and shoot dry matter, and has no significant effect on chlorophyll index and on other parameters ($P \leq 0.1\%$). Garlic population had significant effect ($P \leq 0.5\%$) on chlorophyll index and had significant effect ($P \leq 0.1\%$) on other parameters. The highest and the lowest bulb yield were obtained in wheat straw mulch with Hamedan population (31.81 t.ha^{-1}), and wheat straw mulch with Baghmalek (10.17 t.ha^{-1}) respectively. Consequently cow dung mulch can be recommended for sustainable production for medicinal plants such as garlic in this region.



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**STUDY OF DIFFERENT WEED MANAGEMENT METHODS OF
THYME (*THYMUS VULGARIS* L.)**

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In order to compare different weed management methods and selection of the best control method in Thyme, an experiment was carried out into a randomized complete block design with 16 treatments and three replications in 2008-2009 at the research field of the medicinal plants departments, Shahed University, Tehran, Iran. Two series of 8 treatments were applied on 2 and 3 year old of Thyme (*Thymus vulgaris* L.). At each experiment, treatment included: Weeding (Spring), Cultivation (Autumn and Spring), Cultivation (Spring), Ronstar (2 liter/ha), Ronstar (3 liter/ha), Ronstar (4 liter/ha) and two treatments weeding or keep weedy in whole season were also included as checks. Although, all treatments in both experiments showed significant effects ($p \leq 0.01$) on the fresh and dry weights of weeds and Thyme yield including fresh and dry weight, percentage of essence and yield of essence, but the effect of each treatment by itself, was not as much as the effect of full-season control of weed. The best treatment for reduction of fresh and dry weed weight and also to increase fresh and dry yield and essence yield for 2 and 3 year old Thyme was weeding after full-season control of weed. In contrast, the best treatment to increase the percentage of essence was cultivation (Autumn and Spring) and to reduce the percentage of essence was Ronstar (2 liter/ha).



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**EFFECT OF HUMIC ACID AND VERMICOMPOST ON FLOWER
YIELD, SEED YIELD AND YIELD COMPONENTS OF SAFFLOWER IN
KERMAN, IRAN**

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Application of Biofertilizers in a sustainable agriculture system improves sustainability of yield in field crops production. Safflower (*Carthamus tinctorius* L.) is one of field and medicinal crops that due to immense adaptation with environmental factors can contribute to secure nation oilseed requirement. Safflower is grown as medicinal for the treatment of cardiovascular disease, male and female sterility, lowering blood cholesterol, various types of rheumatism, respiratory diseases, gastritis, etc. In order to investigation the effects of various levels of vermicompost (zero, 3, 6 and 9 ton/ha) and humic acid (0, 1000, 2000 and 3000 ppm) on spring safflower (Local variety belongs to Isfahan), this research was conducted in split plot experiment based on randomized complete blocks design with three replications in Kerman during 2012. Vermicompost and humic acid treatments were allocated to main plots and sub plots, respectively. In this experiment seed yield, yield components and flower yield were measured. Results showed that vermicompost increased seed yield, flower yield, heed number per plant and seed number per head, significantly but 1000 seed weight was not affected by vermicompost. Flower yield, heed number per plant, seed number per head and 1000 seed weight were affected by humic acid treatments and increased from 1000 to 3000 ppm, significantly. Mean comparison showed that, 9 ton vermicompost /ha produced higher seed yield (3374.17 kg ha⁻¹) and flower yield (216.75 kg ha⁻¹). Also, foliar Application of 3000 ppm humic acid produced the highest seed yield (3032.5 kg ha⁻¹) and flower yield (163.87 kg ha⁻¹).

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**INTRODUCTION OF MEDICINAL PLANTS OF ZALIAN AREA IN THE
CITY SAREBAND LOCATED IN THE MARKAZI PROVINCE**

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The Kolahe mountain protected area is located in north of Sareband city Province. The view of area is Cold mountainous. Altitude domain of area is between 1440 to 2550m. The average annual rainfall is about 700 mm. The average maximum temperature is 26.2°C in August and minimum temperature is -30°C in January. This investigation was done for collection and determination of medicinal plants of Kolahe mountain protected area. By regard to source, aware and informed persons and visible observations were determined 90 medicinal species and were noted some of information as: Persian name, scientific and family name, Vegetative form. This medicinal plants belonged to 64 genus and 25 families, that the most species were in Labiatae (16species), Compositae (14species) and Papilionaceae (9 species) families. The flora of area belonged to Irano – Turanianregion.



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EFFECT OF WORMWOOD (*ARTEMISIA ABSINTHIUM*) ESSENTIAL OIL ON ANTIOXIDANT STATUS AND LIPID PEROXIDATION IN BROILER CHICKENS

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Beneficial effects of botanical additives in farm animal may arise from activation on feed intake and digestive secretions, antioxidant, immune stimulation, antibacterial, coccidiostatical, antihelminthical, antiviral or anti-inflammatory activity. This study was conducted in order to determine the use of wormwood essential oil in broiler nutrition as a natural antioxidant substance instead of synthetic antioxidants. Different levels of wormwood essential oil added to standard diet, to determine its effect on antioxidant status and lipid peroxidation compared to control group. 240 day-old male broilers (Ross-308) were divided into groups of 48 chickens each, and randomly assigned to based diet. Experimental groups were as follow: Control group without additive, positive control group with 200 ppm vitamin E and groups of containing 100, 200 and 300 ppm wormwood essential oil. The result showed that addition wormwood essential oil significantly ($P < 0.05$) increased serum total antioxidant capacity and decreased malondialdehyde in broilers at 42 days of age. The highest liver superoxide dismutase activity observed in birds received 200 ppm wormwood essential oil ($P < 0.05$). All dietary groups decreased ($P < 0.05$) malondialdehyde concentration in liver and kidney when compared with the control group. There were no significant difference between experimental groups regarding glutathione peroxidase activity in liver and kidney. In conclusion the results show that essential oil of wormwood improved antioxidant status, and decreased lipid peroxidation in broiler chicks, and it could be consider a potential natural antioxidant for poultry diets.



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**EFFECT OF ESSENTIAL OIL OF CUMIN (*CUMINUM CYMINUM*)
MEDICINAL HERB ON ANTIOXIDANT STATUS, LIPID
PEROXIDATION AND SERUM METABOLITIES IN BROILER
CHICKENS**

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The present study was conducted to investigate the effect of different levels of cumin essential oil on antioxidant status, lipid peroxidation and serum metabolities in broiler chickens. 240 day old male broiler chickens (Ross 308) were randomly allocated to 7 treatments with 3 replicates and 12 birds in each. The dietary treatments consisted of the basal diet as control, diet containing 200 ppm vitamin E as positive control, and 100, 200 and 300 ppm cumin essential oil added to the basal diet. Results of this study showed that the addition 200 and 300 of cumin essential oil significantly ($P<0.05$) increased total antioxidant capacity in serum broiler chicks when compared with other dietary groups. Birds received vitamin E and Cumin essential oil in the diet, had lower ($P<0.05$) malondialdehyde concentration in serum, liver and kidney than control group except group containing 100 ppm cumin essential oil. Supplementation of diet with 300 ppm cumin essential oil, increased ($P<0.05$) total superoxide dismutase activity in liver when compared to that in control group. The inclusion of vitamin E and essential oil of cumin in broiler diets did not affect in kidney and liver glutathione peroxidase activity, and serum metabolities of the chickens. These results of present study suggested that supplementation of cumin essential oil at used levels to broiler diet improved antioxidant status, and decreased lipid peroxidation, and it could be consider as a replacement for synthetic antioxidant in diet.



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**EFFECT OF DIFFERENT SALINITY LEVELS ON GERMINATION
AND EARLY SEEDLING GROWTH OF MEDICAL PLANT
CAPPARIS SPINOSA L.**

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Capparis spinosa is a medical plant in Sistan region, Iran. This research was carried out in order to test the effects of different salinity levels on germination and early growth of *Capparis spinosa* seedling. The experiment was carried out using completely randomized design with four replications in 2012 at University of Zabol. Experimental treatment includes 4 levels of NaCl concentration (check, 50, 100 and 150 Mm). Result showed that the most percentage and speed of germination, plumule length, radicle length, seed vigor, and heaviest fresh and dry seedling weight referred to control treatment. In 100 Mm and more concentration, germination decreased significantly which in 150 Mm, germination had been stopped also. This reduction in germination indicates this plant's extreme insensitivity to salinity, so it isn't advisable for cultivating in salinity soil. All the result data analyzed by SPSS software and comparison of means had been done with Duncan test in 0.05% probable level.



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**STUDIES ON SEED GERMINATION AND SEEDLING GROWTH IN
MENTHA LONGIFOLIA L. UNDER ABIOTIC STRESS CONDITIONS**

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The changing environmental conditions and increasingly heavy metal concentration in soil has been a major concern for growth of medicinal plants widely used in pharmaceutical and ayurvedic formulations. The need is to develop effective means to regenerate and grow medicinal plants under changing environmental conditions. The realization of this strategy requires an understanding of agronomic requirements of the medicinal plant species including the responses to variations in growth conditions on account of abiotic stresses. Present study is an attempt to determine the influence of abiotic stress viz., water-deficit (PEG), salinity (NaCl) and heavy metal (Cd), germination, seedling growth and seed vigour index (SVI) of *Mentha longifolia* L., an important indigenous medicinal plant of Lamiaceae family. Seed germination was enhanced by all the three factors tested i.e. PEG, NaCl and Cd; the degree of enhancement was found to be maximum in case of PEG. Seedling growth and SVI was suppressed by PEG, NaCl and Cd. Cadmium stress was most inhibitory.



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**EVALUATION OF HEAVY METALS IN SOME MEDICINAL PLANTS
GROWING IN SISTAN REGION**

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Medicinal plants were the potent source of therapeutic molecules to heal various diseases in the world. The amount of heavy metals in the plants was analyzed to show the potential threat of their effects to the animals and human beings who consume them as such or their derived products. The work is much more beneficial as the actual nutrient content of the medicinal plants in terms of the essential trace elements could also be identified. The concentration levels (mg/l) of the selected trace metals (Ni, Cu, Cr, Zn, Mn, Pb) were estimated in some of the important herbal plants of the Sistan region. The atomic absorption spectrophotometer was employed for the estimation of heavy metals of four different plant species that were collected from different locations within Sistan region. The plants selected for the analysis were *Malva sylvestris* L., *Cardaria draba* L., *Datura innoxia* Mill. and *Rubia tinctorum* L.. The metal contents in the samples were determined and was found that *Malva sylvestris* L. has the level of metals in the range of Cu>Cr>Mn>Zn, *Cardaria draba* L. Cu>Cr>Zn>Mn, *Datura innoxia* Mill. has Cu>Zn>Cr>Mn and *Rubia tinctorum* L. has Cu>Mn>Zn>Cr. Nickel and lead was found completely absent in all the four plants investigated.



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ANTIBACTERIAL ACTIVITY OF *TEUCRIUM POLIUM* ESSENTIAL OIL AGAINST CLINICAL ISOLATES OF *KLEBSIELLA PNEUMONIAE*

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The alarming resistance rate of bacterial pathogens to majority of available antibiotics has increased the interest for using natural plant products as alternative agents. We determined the antibacterial activity of *Teucrium polium* essential oil against 15 multidrug resistant clinical isolates of *Klebsiella pneumoniae*. The aerial parts of *Teucrium polium* were collected at full flowering stage at Tehran, Iran. The essential oil was isolated by hydrodistillation and analyzed by a combination of capillary GC and GC-MS [1, 2]. Antibacterial activity was measured against clinical isolates of *K. pneumoniae* as well as the ATCC bacterial standard by disc diffusion. Minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) were also determined using broth microdilution [2, 3].

Teucrium polium essential oil contained 20 constituents of which the major components were β -Caryophyllene (29%), Farnesene (13%) and β -Pinene (11 %). The susceptibility of 13 (86.7%) *K. pneumoniae* clinical isolates was shown by disc diffusion. MIC and MBC values were 0.62 mg/ml for the 13 clinical isolates as well as the ATCC standard and confirmed the disc test results. *Teucrium polium* essential oil may have a potential to be used against multidrug resistant organisms such as clinical isolates of *K. pneumoniae*.

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**THE EFFECT OF METHANOL AND NANO-IRON CHALATE
FERTILIZER ON CHLOROPHYLL CONTENT, SOME
MORPHOLOGICAL AND AGRONOMICAL TRAITS OF
OCIMUM BASILICUM L.**

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As photosynthesis is the plants' success key in their competition and the leaves are photosynthetic main organs in plants, the effect of different concentrations of methanol and nano iron chalate fertilizer on some leaf parameters of *Ocimum basilicum* L. was evaluated. This study was conducted based on factorial in completely randomized design with three replications in research greenhouses of Institute of Medicinal Plants, ACECR located in 16th Kilometer of Karaj-Qazvin Highway, Iran. The methanol spraying was done in five levels (0, 10, 20, 30, and 40 volume ratio percentage) and as for nano iron chalate fertilizer; the levels were 0, 500, 1000, and 1500ppm. The results showed that the interaction of methanol and nano iron chalate fertilizer had significant effect on leaf wet and dry weight ($P<0.01$) and the number of leaves ($P<0.05$). Of course, it hadn't significant effect on the chlorophyll content and leaf area of the plant. The effect of nano iron chalate fertilizer on the chlorophyll content ($P<0.01$) and the leaf area ($P<0.05$) was significant. The maximum number of leaves and leaf dry weight was related to the treatment methanol 30% and nano iron chalate 1000ppm. The highest leaf wet weight was related to the treatment methanol 40% and nano iron chalate 1000ppm. The maximum leaf chlorophyll content belonged to nano iron chalate fertilizer 1500ppm and the maximum leaf area was related to nano iron chalate 1000ppm. Generally, this study indicated that methanol and nano iron chalate fertilizer had positive effect the biomass, chlorophyll content and leaf area of basil as the most important photosynthetic organ.

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NEW TRENDS IN THE UTILIZATION OF MEDICINAL AND AROMATIC PLANTS

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The use of medicinal and aromatic plants has never been out of focus throughout history. Our time, on the other hand, is witnessing a different approach to their utilization. For the first time in history, they have become industrial products for worldwide use. New concepts, such as nutraceuticals, cosmeceuticals, phytotherapy, aromatherapy, etc. are widening their use and new applications in functional foods, animal husbandry and agricultural pest management are taking place. New clinical evidence is also emerging on the effectiveness of medicinal plant products. The appearance of increasing number of monographs on plant drugs in national and international pharmacopoeias is a good indication that legislative and regulatory authorities have a more positive view towards the increased use of medicinal and aromatic plants in conventional medicine. This paper will focus on the above aspects from a global point of view.



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**RESPONSE OF ANTICANCER COMPOUNDS TO NITROGEN
FERTILIZER IN NAEIN-E HAVANDI (*ANDROGRAPHIS PANICULATA*)**

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Naein-e Havandi (*Andrographis paniculata*) is a medicinal herb in the family Acanthaceae. The plant extract contains three major compounds namely diterpenes, flavonoids and stigmaterols with the active compounds identified as andrographolide (AG), neoandrographolide (NAG) and 14-deoxy-11, 12-didehydroandrographolide (DDAG) with a wide scope of pharmaceutical properties such as anti-HIV, anti-H1N1, anticancer and anti-hepatitis [1]. Phytochemical responses to nitrogen fertilization are useful measurements to determine favorable habitat conditions for the cultivation of medicinal plants. The goal in commercial medicinal plant production is to produce high dry herbage yields with high phytochemical content. We analyzed the leaf diterpenoid contents in *A. paniculata* at five nitrogen rates using (33.5%) ammonium nitrate (50, 100, 150, 200 and 250 kg ha⁻¹) using HPLC. The experiment was arranged in a randomized block design with three replications. Before flowering stage, the plants were harvested. The results revealed significant effects of nitrogen levels on total shoot (S_w), leaf (L_w) and stem (St_w) dry weight, NAG and DDAG concentrations, while there were no significant difference on root dry weight (R_w) and AG amount ($P < 0.01$). The greatest S_w (29.72 g), L_w (17.53 g) and St_w (12.20 g) were observed at the highest rates of N (250 kg ha⁻¹). The highest amount of AG (3.49 $\mu\text{g g}^{-1}$) and NAG (1.15 $\mu\text{g g}^{-1}$) per leaf dry matter were observed at the rate of 200 kg ha⁻¹ nitrogen fertilization, and the highest amount of DDAG (0.25 $\mu\text{g g}^{-1}$) was observed at the rate of 150 kg ha⁻¹. The highest rates of nitrogen fertilization (250 kg ha⁻¹) significantly decreased the amount of all three main compounds. These results suggested that *A. paniculata* could reach high biomass and yield of diterpenoids with 250 and 200 kg ha⁻¹ nitrogen fertilization respectively. In agreement with the reports of Gayler et al. [2] and Yasmeeen et al. [3], the findings of this study indicated that increasing nutrients, especially nitrogen, increased diterpenoid concentrations but decreased phenolics contents.

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**PHOTOSYNTHESIS AND ANTIOXIDATIVE SYSTEMS OF NAEIN-E
HAVANDI (*ANDROGRAPHIS PANICULATA*) AS AFFECTED BY
COMPOST TEA RATES**

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Andrographis paniculata (2n=50) known as Naein-e Havandi in Iran, is a medicinal herb in the family Acanthaceae. The leaves of the mature plant contain abundant diterpenoids of medicinal properties [1]. This study was conducted to investigate the photosynthesis and antioxidant of naein-e havandi as affected by compost tea rates to determine the optimum level of fertilizer rates required for optimum growth and quality of naein-e havandi. The plant was propagated using seed and planting in a polybag. After four weeks, the plant was transplanted into polybag sized 20 cm × 25 cm. Compost tea was used at rates of (0, 25, 50, 75 and 100 %). Treatments were arranged in Randomized Completely Block Design with three replicates. Before flowering stage, the plants were harvested. The results revealed that rates of compost tea significantly affected total dry weight, leaf area, chlorophyll, stomatal conductance, FRAP and total flavonoid contents, while there were no significant difference on DPPH, and total phenolic contents and photosynthetic rate (P<0.01). Soil amendment with compost tea gave a favorable effect on growth and improved soil pH and CEC. Total flavonoid was highly significantly differences among the treatments. The greatest TDW (26.15 g), FRAP (96.03 % of inhibition) and flavonoid (1943.7 mg/g) were observed at the 70% rate of compost tea. The highest rates of compost tea (100%) significantly decreased the phenolic and flavonoid compounds. These results suggested that *A. paniculata* could reach high biomass and quality characteristics with 50 and 70% rate of compost tea. However, in general compost tea had a good potential to improve soil pH and increase plant growth and antioxidant contents. In agreement with the reports of Hendawy [2] and Yasmeen et al. [3], the findings of this study indicated that increasing nutrients, especially nitrogen, increased yield and antioxidant contents.

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**EFFECTS OF WATER STRESS (DROUGHT) ON THE MINERAL AND
VITAMIN CONTENT OF THE LEAVES OF A MEDICAL PLANT
BRASSICA RAPA L.**

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The effects of water stress (drought) on mineral and vitamin content of the leaves of *Brassica rapa* L. was investigated. *B. rapa* plants were cultivated in plastic planting buckets and were subjected to mild water stress by supplying each planting bucket with 500 ml of water once in a week. In the control treatment, each planting bucket was supplied with 750 ml of water three times in a week. Treatment started two months after seedling emergence. Treatment occurred for one month. The leaves were then harvested for analysis. The results obtained showed that water stress, significantly ($p < 0.05$) reduced the potassium and calcium content of the leaves of *B. rapa*. On the other hand, water stress caused a significant increase ($p < 0.05$) in the nitrogen content of the leaves of the plants studied. The observed decrease in the potassium and calcium content of the leaves of *B. rapa* might be as a result of the mobilization of these mineral from the leaves to the roots of stresses plants where they act as osmoprotectants, assisting the plants to resist water stress (drought). However, the increase in nitrogen content due to water stress might be due the mobilization of nitrogen to the leaves for the synthesis of needed amino acids and proteins to enable the plants to withstand the effect of water stress. Water stress had to significant effect on the percentage concentration of sodium, magnesium and phosphorus of the leaves of *B. rapa*. The ascorbic acid and niacin content of the leaves of the plants were significantly ($p < 0.05$) reduced by water stress. It however, had no significant effect on the riboflavin and thiamine content of the leaves of the investigated plants. The reduction in the ascorbic acid and niacin content of the leaves of the plants might be as a result of their breakdown during stress as a mechanism to assist the plants to resist water stress. The results obtained are discussed in relation to importance of the plant in maintenance of good health.



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THE EFFECTS OF HYDROALCOHOLIC EXTRACT OF *NIGELLA SATIVA* ON THE ACTIVITY OF LIVER ENZYMES IN FEMALE RATS

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Bleak seeds with scientific name, *Nigella Sativa*, belong to the Ranunculaceae family and have been used for prevention and treatment of many diseases in traditional medicine such as sexual impotence. In order to evaluate the side effects of this herbal drug, the effect of hydroalcoholic extract of Black Seed on the activity of liver enzymes was studied. In this research, 35 adult female Wistar rats weighing approximately 250±50g were divided into 5 groups with 7 members as follows:

Control group (without treatment), sham (take alcohol by intraperitoneal injection) and 3 experimental groups were injected intraperitoneally respectively (100, 200 and 400) mg/kg/b.wt hydroalcoholic extract of Black Seed that was prepared by maceration method. After treatment period (21 days), blood samples were taken from all groups. Its serum was separated for biochemical study by ELISA method. Using statistical software, SPSS 18, data were analyzed by One Way ANOVA and Duncan test at the significant level of 0.01 and 0.05. Findings showed that Alkaline phosphatase (ALP) in all experimental groups increased significantly compared to control group ($p < 0.01$). Aspartate aminotransferase (AST) in treatment 1 and 2 and Alanine aminotransferase in treatment 1 increased significantly compared to control and sham group ($p < 0.05$). The obtained results showed that the hydroalcoholic extract of Black Seed has destructive effects on liver and use of that should be restricted.

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INFLUENCE OF SOME ENVIRONMENTAL FACTORS ON THE MORPHOLOGICAL TRAITS OF *THYMUS DAENENSIS* CELAK.

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The genus *Thymus* (Lamiaceae) is comprised of important aromatic species, one of which is *Thymus daenensis*. This species is endemic of Iran which widespread over the Zagros Mountains and some areas in the Alborz Mountain range. The aim of this study is to investigate effects climate conditions of studied areas on vegetative and reproductive characteristics of *T. daenensis*. The significant relationship was revealed between some morphological characters and some environmental factors by using of correlation analysis. The amount of weight decrease and Bract length were more affected by environmental factors, and among of climate factors, temperature and relative humidity were the most effective factors on morphological traits.



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**IMPROVEMENT OF SOLVENT SYSTEMS IN TLC
CHROMATOGRAPHY OF FLAVONOIDS FROM LEAVES OF
GLYCYRRHIZA GLABRA L. AND *FRITILLARIA IMPERIALIS* L. USING
A SOFTWARE SYSTEM**

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This study is concerned with 70 solvent systems using 11 different solvents (including Water, Formic Acid, Acetic Acid, MeOH, EtOH, Iso-Propanol, Butanol, Acetonitrile, Ethyl Acetate, Acetone and Chloroform) used for separation of total flavonoid extracts from 48 different populations of *Glycyrrhiza glabra* and *Fritillaria imperialis* and *F. persica* from Central Zagros Mts. of Iran, using 110 TLCs (thin layer chromatography). Each solvent system was defined after addition or deletion of solvents from previous solvent system or changes in percent of each solvent in previous solvent system. Resultant chromatograms were inspected under UV254 and UV366 and digital photos were taken, and entered in a computer program designed for this purpose under MS-Access database. The computer program allowed us to search among all combination of solvents or ranges encompassing them in solvent systems, and to use previous results for improvement of solvent systems. The software also allowed us to define different projects and search TLCs in each project separately and make useful reports from textual and photographic data. Our survey for TLC of total flavonoids from specimens from *Glycyrrhiza* and *Fritillaria* spp. resulted in 1-dimensional separation of flavonoids spots of 24 samples on a single silicagel G254F plate using improved solvent systems. The above mentioned software is available for research community as open source, accessible from website of University of Shahrekord.



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**DISTRIBUTION OF *SPIRULINA* THE BLUE-GREEN GOLD OF
IRAN**

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The *Spirulina* is known as a superfood and is ideal for sports people, pregnant women, vegetarians and those wanting an extra energy boost. Phycocyanin is one of the main blue-green pigments found in *Spirulina* and has potent antioxidant properties. Water extract of *Spirulina platensis* (*Arthrospira platensis*) inhibits HIV-1 replication in human derived T-cell lines and in human peripheral blood mononuclear cells [1]. There is no doubt that studies which based on distributions and biodiversity for natural resource is very important to development of knowledge-base for any of countries. This blue-green alga with more than 100 species has a world wide distribution. The seven species for genus *Spirulina* has been reported from localities of Iran [2]. The most of them distributed in Anzali and Miankaleh wetlands, Zayandehrood river and seashores of Persian Gulf in Gilan, Mazandaran, Esfahan and Hormozgan provinces, respectively. By using DIAR (Distribution on Iran by Analytical Retrieval) software, mapping of distribution for these species carried out on the provinces as a basic map but the natural geography as thematic mapping analyzed and other factors such as altitudes, climates, rainfalls, temperatures, watersheds and general geological maps of Iran have been done, too[3]. The limits of these ordinations in main geographical directions are essential to reviewing of the best habitats for this useful alga. The results of this study promote many ideas to cultivations and processing endemic species of *Spirulina*. The most important results of this study is a promotion of many ideas and would be available for cultivation of endemic species as searching of blue-greenish gold in Iran!

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ELECTROBOTANY OF MEDICINAL ALGAE OF IRAN

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This study based on fundamental concepts of electronics and phycology in the last three decades. The emphasis on identification of harmful and useful especially medicinal algae species of Iran was the main research. Now, this aim by using algorithm EID (Electronic Identification) and with interactive identification key as well as visual utilities is very simple and practical for anyone [3]. There are more than 50 species of fresh water and marine algae have been recorded from Iran which whole of them have many benefits for medicine, direct and or indirectly [1]. Also, the integrated study for diversity and distribution is very essential and it helps to knowing better these organisms in ethno-botany [2]. The numerical analysis of geographic data carried out especially on natural maps of Iran such as altitudes, climates, rainfalls, temperatures, watersheds and general geological maps for medicinal algae species. On the other hand, the knowledge of electricity using by biological materials such as electrophotography (EPG) makes developments on the electrophysiological procedures. Some of the common algae such as *Chara* and *Nitella* species are as the basic bio-materials in laboratories and probing using micro electrodes for capture of bio electrical signals such as pulse and response. A study of the characteristic curvatures about output signals produces an electrochemical description for behavioral function of living cell. Interpretation by using an electrical model is useful for researchers in neurology, cytology, paramedical and techniques of ECG, EEG, EMG and so on. Doubtless, by integration of electricity as a powerful phenomena and algae organisms as pioneers of our biosphere have been proposed many of ideas for medicine, from the past to future!

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**INTRODUCTION TO ENGINEERING FOR MEDICINAL PLANTS OF
IRAN**

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Integration of medicine and plants makes multidiscipline status in medical and botanical researches. The comparisons and relations between traditions vs. moderns, history vs. geography and finally the arts vs. science, produce complexity in this domain. Generally, an engineer looks for methods and materials to preparing a logical decision which based on the measurable facts. The first and very important step in this aspect is making of procedures as algorithm of identification [1]. By using expert systems with nonlinear database, all of the vegetative organisms such as plants, algae, lichens and fungi would be classified and related to botanical descriptions with emphasis on parts and types of usages for healing of diseases and disorders. In addition, the clinical diagnostics as simple as a questionnaires supports the identification and or redirection process which documented as a technical report. Also, mapping of distribution for these organisms is very useful for applied and ethno botany. The provinces map is basic map but the natural geography as thematic mapping analysed by altitudes, climates, rainfalls, temperatures, watersheds and general geological maps of Iran [2]. The limits of these ordinations in main geographical directions is essential to reviewing of the best habitats for medicinal plants. Therefore, the major objectives with multi selection utilities for activities, organisms and localities, improves the management and development for medicinal plants of Iran. This engineering concept referred to many studies and operational researches in the last three decades and a provisional version released now.

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THE CITES AND MEDICINAL PLANTS OF IRAN

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The CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its main aims are to ensure that international trade in specimens of wild animals and plants does not threaten their survival. For many years, CITES has been among the conservation agreements with the largest membership, with now 176 parties. Roughly 29,000 species of plants are protected by CITES against over-exploitation through international trade. They are listed in the three CITES appendices [1]. The appendix I lists species that are the most endangered among CITES-listed plants. Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. With respect to recent list of CITES there are 19 plant species of Iran in appendix II [2]. Results of this study showed that there is no evidence of five species of them occurring in Iran. The rest species belongs to Orchidaceae (5), Amaryllidaceae (5), Primulaceae (3) and Euphorbiaceae (1). All of these 14 taxa studied and the whole of them are medicinal plants. Therefore the critical levels of exploitation for these plant species and the trade in them and some other factors such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. In this study, the environmental and medicinal aspects of these important species have been discussed.

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THE IMPORTANCE FOR AQUATIC MEDICINAL PLANTS OF IRAN

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Iran with two of the world's most arid deserts, covering nearly one third of the country is one of the most arid regions of the world [3]. Therefore, wetlands play an important role in Iran, due to they are vital ecosystems which provide livelihoods for the thousands of people who live within and around them. Also, there are many dependencies to wetlands such as drinking water, agriculture, fishing, etc. The wetlands perform some important functions in relation to climate change and adaptation effects through their ability to store and regulate water [2]. There are more than 100 sizeable wetlands in Iran. Humans have utilized aquatic plants as food, fodder and medicine, historically. Results of this study indicate there are about 300 aquatic plant species in Iran. More than 70% of them are monocots and the rests are dicots and about 1% belongs to lower plants. The types of growth forms which based on special habitats such as emergent, submerged and floating were defined. The most of aquatic plants of Iran have medicinal efficiency but a few species of them have edible and medicinal usage by indigenous people i.e. *Nelumbium capsicum* (Caspian lotus) as a delicious food item and sold in the name "Pistacio of marsh" and *Nasturtium officinale* (water cress) as a vegetable and medicinal plant and sold in the name "Bolagh-ooti". The ethno-botanical information serves as a base for new compounds with active principles for phytochemical, pharmacological and clinical researches [1]. The survival of aquatic plants as medicinal products is very important, especially those having economic value. Conservation of wetlands and sustainable use of them are very essential because the many of pollutants absorbed by these species. So, for optimized usage of these species needs development of technical research and traditional knowledge.

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**THE PROSPECTS AND CHALLENGES FOR ALGAE THERAPY IN
IRAN**

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Algae have been used for centuries, especially in Asian countries, as a remedy to cure or prevent various physical ailments [1]. Algae contain numerous vitamins and amino acids, which help to eliminate harmful toxins, nourish the skin and increase circulation. The algal baths are ideal for arthritis sufferers as they reduce painful inflammation of the joints without unpleasant side effects of conventional medicines. The ocean is full of rich vitamins, minerals and trace elements and sea algae absorb high concentrations of these elements. Algae therapy uses specially prepared marine algae, which is rich in nutrients, mineral ingredients and trace elements to help the body function at its optimum [3]. More than 2000 algae species has been reported from marine, brackish and fresh water habitats in Iran [2]. The traditional uses of algae as a medicinal resource referred to Urmia lake and many of hot and cold streams and springs of north and central provinces of Iran. Some of the extractions of brown algae in southern coasts such as Omman Sea and Persian Gulf are valuable for pharmacognosy. Therefore, the high potentials for algae of Iran make many economic applications i.e. development of exports, ecotourism and so on. The technology and knowledge base of industrial cultivation using high performance bioreactors and purification of algal substances is the major challenge in this domain.

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**OPTIMIZATION OF MICROENCAPSULATION OF POMEGRANATE
SEED OIL BY RESPONSE SURFACE METHODOLOGY**

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Pomegranate (*Punica granatum* L.) is an ancient fruit that is mainly consumed fresh, and it is being used in the preparation of soft drinks, jams, etc [1]. Pomegranate seed is a residue obtained from juice and it contains vitamin E, sterols and punicic acid. The seeds are rich in lipids, which vary between 140 to 270 g/kg dry matter [2]. The seeds contained oil in range of about 66.3-193 g kg⁻¹ dry matter. Pomegranate seed oil is highly concentrated in punicic acid. Pomegranate seeds oil is well known to contain a natural phytoestrogen, powerful antioxidant.

In this work the influence of some process conditions studied on the microencapsulation of pomegranate seed oil by spray drying. The process was carried out on a mini spray dryer. Cold pressed pomegranate seed oil was used as core material and mix of maltodextrin and gum Arabic were used as wall materials. The response surface methodology (RSM) was employed to optimize the microencapsulation condition of pomegranate seed oil. Seventeen tests were performed, according to second- order central composite design. Independent variables were maltodextrin concentration in wall material (X1), emulsion solid (X2) and oil concentration related to emulsion solids (X3). With respect to these three variables microencapsulation efficiency (MEE) and microencapsulation yield (MEY) was investigated [3]. The quality of microcapsules and morphology of microcapsules was studied with scanning electron microscopy (SEM). The solid content, amount of oil concentration in microcasules optimized on the basis of higher microencapsulation efficiency and higher yield.

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EFFECT OF SUCROSE CONCENTRATION ON THE GROWTH AND TRIGONELLINE PRODUCTION IN HAIRY ROOT CULTURE OF IRANIAN FENUGREEK (*TRIGONELLA FOENUM-GRÆCUM* L.)

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Trigonelline is a plant hormone which is claimed to have anticarcinogenic, antimigraine, antiseptic, especially on diabetes [1]. In this article, we first describe the effect of *T. foenum- graecum* L. transformation by *Agrobacterium rhizogenes* strains ATCC15834, MSU440 and K599. Another objective was to investigate the influence of basic MS media sucrose concentration on growth and trigonelline production. After appearing of hairy roots a molecular analysis by PCR [2]. Then, the hairy and normal roots were cultured in suspension MS media and the treatments were arranged in an experimental based on Randomized Complete Block Design with 3 replication. After 28 days, The trigonelline contain of roots were analyzed by HPLC method [3]. The hairy roots cultured in MS media supplemented with 60 mg/l sucrose increased trigonelline production 13.03 mM/g dry mater and the lowest was achieved in MS media supplement with 15 mg/l sucrose 5.12 mM/g dry mater.

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INVESTIGATION THE SUSTAINABILITY OF MAZOOJ GALL AND
ITS INDUCER AGENT WASP IN OAK FORESTS OF WEST-
AZERBAIJAN

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Gall-inducer wasps cause the formation of different species of galls, regarding their structure and shape, on various organs of oak trees such as branches, leaves, roots, and fruits [1,2]. In some cases, external structure of the galls contain more chemical substances (phenolic compounds and tannins) than the normal tissues of the host plants because of providing the effective defense mechanisms for protection of the gall-former factors [3]. One of the types of galls caused by gall wasps in Iran is Mazooj that is formed on the branches of *Quercus infectoria* Olive. Which have numerous medicinal and industrial properties. Considering the significance of Mazooj gall, the present study was carried out to assess the stability of this gall in different parts of West-Azerbaijan province. A total of 30 trees in the investigated areas (Pardanan, Mirabad, Sardasht, Bazarche-Marzi and Nalas) were selected and the oak galls formed on them were counted twice in 2012 (mid August and mid September). Using the following formula: $SI = (\rho / P) \times 100$ the degree of stability of galls in various regions was calculated. In the above formula which is shown as a percentage, SI is the stability index, P is the total of the samples collected from the area, and ρ is the samples containing the studies species (Mazooj). Based on the SI values the following categories are detectable [4]: a) stable species with the stability index greater than 50 %, b) transient species with a stability factor between 25 to 50 %, and c) accidental species with the stability coefficient less than 25 %. The highest and lowest values of Mazooj stability and its inducer wasps (*Andricus sternlichtii*) (55 and 17 percent) were recorded in the Bazarche-Marzi and Pardanan regions, respectively. The Mazooj gall was considered a stable species only in Bazarche-Marzi of Sardasht since the stability in this region is closely related to its special climate (humid Mediterranean). Therefore, this area is more suitable for field studies on gall oak.

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VOLATILE OIL OF *ARTEMISIA SANTOLINA* DECREASED THE MORPHINE WITHDRAWAL JUMPING IN MICE.

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Flowered aerial parts of *Artemisia santolina* Schrenk (*Asteraceae*), which is found in the central and western regions of Iran were collected from Khorasan province and the volatile oil extracted by hydro distillation. The oil (0.5 % v/w) was analyzed by GC and GC/MS using DB-5 column. The effect of this oil on the withdrawal syndrome was determined in mice. After induction of dependency by morphine, mice were intraperitoneally administered different concentrations of the oil. Morphine-withdrawal, inducing by naloxone, was assessed by recording the incidence of escape jumps for 60 minutes. The results indicated that a significant difference between the essential oil received group (at dose of 3.6 mg/ kg) and control group was shown but the lower doses were not effective. Essential oil analysis showed that there were forty-six components, representing 95.4% of the oil. The oil of *A. santolina* which is rich in oxygenated monoterpenes with the major components, *trans*-verbenol (34.6%) and *p*-mentha3-en-8-ol (13.1%), can decreased the number of withdrawal jumping in addicted mice.

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**SPECIES DIVERSITY AND DISTRIBUTION OF THE MEDICINAL
GALLS BY OAK GALL WASPS SPECIES IN WEST-AZERBAIJAN**

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Insects are one of the gall-inducing agents and produce various galls on the number of plants species. Among the insects, oak gall wasps (Family: Cynipidae) are important and the tribe Cynipini in subfamily Cynipinae were named oak gall wasps. Oak gall wasp species have a high richness in the West-Azerbaijan province. 36 oak gall wasps species associated with oak *Quercus infectoria* has been reported from Iran [1]. The recent surveys were conducted about the Cynipids fauna in Iran [2,3] and according to the latest results, so far 82 species of oak gall wasps have been introduced in the oak forests of Iran whereas 25 species are reported in the world for the first time [4]. In this study, we have counted 150 trees in five sites (30 trees per each site) in the oak forests of West-Azerbaijan province. The occurred galls by oak gall wasps were collected from the regions such as Pardanan, Mirabad, Nalas, Sardasht and Ghasemrash during April to November 2012. Species richness and also the parameters such as Shannon's H' and Simpson's index were calculated with the Ecological Methodology 6.0 software. At last, four galls in relation to four gall wasps species which have high percent of tannin and have medicinal effects were recognized. These gall wasps species are: *Andricus sternlichti*, *A. quercustozae*, *A. mediterraneae* and *A. insana*. These galls were produced on the branches of *Quercus infectoria* oliv. There were differences among sites; Ghasemrash had the highest diversity and abundance of gall wasps among study sites. The highest amount of species richness of gallotannin was recorded in Ghasemrash (four species). Also, the highest amount of Simpson (0.79) and Shannon's H' (1.1) diversity indices were recorded in Pardanan and Ghasemrash, respectively. Naturally some species overlap between sites.

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**IDENTIFYING THE BEST TIME TO HARVEST OF MAZOOJ GALL IN
OAK FORESTS OF WEST-AZERBAIJAN PROVINCE**

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Galls related to the oak gall wasps are formed on different parts of trees like branches, leaves, inflorescence, and even roots [1, 2]. In West-Azerbaijan, three species of oak namely *Quercus infectoria*, *Q. brantii* and *Q. libani* and their subspecies have been found [3] and various galls are formed on these oak species by gall-former wasps family Cynipidae [4,5]. Some of these galls contain high amounts of tannin which have many applications in the pharmaceutical and industrial applications. One of these precious galls is Mazooj gall (Mazu). In the current study, every ten days, the galls that formed on oak trees of southern part of Sardasht city were collected, coded, and transported to the laboratory in paper envelopes (2011-2012). Other information such as the formation period from beginning to the full growth, departure time of gall wasps, and the gall extraction method in the areas under study were investigated. The *Andricus sternlichtii* Melika et al. wasp is the gall inducer of Mazooj. This gall has been formed on the branch of *Q. infectoria* in early July in West-Azerbaijan province. In the early stages of formation, this gall is dark green about 10-15 mm in diameter that is called fine Mazooj. As the gall grows and gets bigger, its color becomes light green which is called green Mazooj. In the final stages of its development, gall appears yellowish or creamy that is called yellow Mazooj. Adult insects start their departure from late September which continues till late November. Galls are usually collected by hand from short branches and ground. The harvest of Mazooj is done at two green and yellow stages and their extraction time starts from mid September continues till early November. Premature harvest of small galls reduces the product of the next year since it causes the death of wasps inside galls. The Mazooj galls should be sun dried after extraction so that wasps can leave the galls and return to the nature.

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BIOACTIVE SESQUITERPENE LACTONE FROM *ARTEMISIA SANTOLINA*

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The Genus *Artemisia* L. is one of the largest and most widely distributed of *Asteraceae* (*Compositae*). Most *Artemisia* species known as ‘darmaneh’ in Iran are medicinal herbs, which have had several uses in the folk medicine all over the world. In the present study, *Artemisia santolina* collected from Birjand in the Eastern part of Iran, has been subjected to various chromatography methods to afforded two sesquiterpenes, 1,5- dihydroxy- 4(15) eudesman-12, 6- olid (Artemin) (**1**), 2-hidroxy- 2,6,10- trimethyl- 7,10- oxide-3,11- dodecadien- 5 – one (**2**) and one flavonoid, 5,7,4'-trihydroxy-6,3'- dimethoxyflavone (jaceosidin) (**3**). The structures of these compounds were determined by ¹H- and ¹³C-NMR, HMQC, HMBC, ¹H-¹H COSY and Mass spectral analysis. Cytotoxic activity of the sesquiterpene lactone (**1**), was assessed on *Artemia salina* larvae and resulted in IC₅₀ = 6.44 µg/mL compared to the positive standard berberine hydrochloride (IC₅₀ = 26 µg/mL).

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PRESENCE OF MONOTERPENE SYNTHASE IN FOUR LABIATAE SPECIES AND SPME- GC-MS ANALYSIS OF THEIR AROMA PROFILES.

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Nowadays, some monoterpene synthases, including linalool and limonene synthases, have been cloned and functionally characterized from several plants of Labiatae family. In this study, presence of linalool and limonene synthases, in four species of Labiatae family including *Nepeta cataria*, *Lavandula angustifolia*, *Hyssopus officinalis* and *Salvia sclarea* has been determined by molecular biological techniques together with the Head space Solid-phase Microextraction – Gas chromatography - Mass spectroscopy analysis of the aroma profile of these species. Results indicated that none of the plant species produced distinguishable bands with primer pairs related to *d*-limonene synthase. The degenerate forward primers, designed on the basis of the three conserved sequences of limonene synthase, showed the presence of this enzyme in three Labiatae species (*L. angustifolia*, *H. officinalis* and *S. sclarea*). Furthermore, distinguishable bands around 1800 bp in cDNA samples of *L. angustifolia*, *H. officinalis* and *S. sclarea* were observed regarding to the presence of linalool synthase. Head space SPME-GC-MS analysis of the aroma profiles of the above mentioned plants showed that linalool (31.0%), linalyl acetate (18.2%), lavandulyl acetate (10.7%) and alpha-terpineol (6.3%) were found as the major compounds of *L. angustifolia*, while β -citronellol (8.0%), geraniol (5.5%), nerol (34.0%) and α - citral (52.0%) were identified as the main compounds of the *N. cataria*. The major components of *H. officinalis* and *S. sclarea* oils were determined as *cis*-pinocamphone (57.3%), β -pinene (7.0%), terpinen-4-ol (7.0%), and linalool (19.0%), linalyl acetate (51.5%), α -pinene (4.0%), respectively. The profiles of the main components of these plants are in agreement with molecular assays.

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**MONOTERPENE SYNTHASE FROM *LAVANDULA ANGUSTIFOLIA*
AND SOLID-PHASE MICROEXTRACTION- GASS
CHROMATOGRAPHY-MASS SPECTROSCOPY ANALYSIS OF ITS
AROMA PROFILE.**

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Lavandula angustifolia Mill. (Labiatae) is commercially used as a fragrance and flavor in cosmetics, food and pharmaceutical industries. This aromatic species is widely grown and cultivated in various temperate regions of Persia. There are diverse reports around composition of the oil of this plant in Iran representing linalool derivatives or 1,8-cineol and camphor as the major compounds. In addition, some mono- and sesquiterpene synthases have been cloned and identified from *L. angustifolia*. In the present study, the aroma profile of one cultivated plant in Tehran has been extracted and analyzed via Headspace Solid-Phase Microextraction technique coupled with gas chromatography mass spectroscopy. In order to determine the sequence of the active terpene synthase in this plant, mRNA was prepared, 3' and 5'-RACEs-PCR Method employed, cDNA sequenced and finally aligned with other recognized terpene synthases. The results showed that the cultivated plant leaves mainly comprised linalool (31.0%), linalyl acetate (18.2%) and lavandulyl acetate (10.7%) apposite of the essential oil of plant reported from dry and temperate areas. Sequencing the cDNA cloned from this plant revealed the presence of a monoterpene synthase absolutely similar to limonene synthase, responsible in formation of limonene, terpinolene, camphene and some other cyclic monoterpenes in *L. angustifolia* young leaves.

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**ANTIOXIDANT AND HYDROXYL RADICAL SCAVENGING ACTIVITY
OF PHOENIX DACTYLIFERA L. VAR. DEYRY FRUIT AND SEED**

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Date palm (*Phoenix dactylifera* L.) is from Palmae family. Its fruits are used in some traditional medicines such as: cold, back pain and paralysis. The seed powder is also used in some traditional medicines such as: astringent in intestinal troubles, treating diarrhea and renal stones. Date fruits have anti-cancer, anti tumor, gastric protector, anti inflammation and anti mutation effects. Here, the antioxidant capacity of methanolic and aqueous extracts of Date fruits and seed were investigated. Date fruits were collected from Abadan in Khuzestan. By maceration method with methanol and water solvents, extracts were obtained. Antioxidant activity of methanolic and aqueous extracts was evaluated by five antioxidant assays: FRAP, DPPH, TEAC, hydroxyl radical scavenging activity. In DPPH assay Date seed methanolic extraction ($IC_{50}=0.08\text{mg/ml}$) have the highest capacity of inhibition. In hydroxyl radical scavenging activity assay Date seed aqueous extraction ($IC_{50}=10.89\text{mg/ml}$) have the highest capacity of inhibition. In FRAP assay Date seed methanolic extraction ($EC_1=0.36\text{mg/ml}$) have the highest capacity of inhibition. In TEAC assay Date seed methanolic extraction (TEAC number in minute six =256.92mg/ml) have the highest capacity of inhibition. In all tests except hydroxyl radical scavenging activity, seed methanolic extract had higher antioxidant activity. In test radical hydroxyl scavenging activity seed aqueous extract had higher antioxidant activity.

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**GC/MASS ANALYSIS OF THE VOLATILE COMPOUNDS OF
P. HYRCANICUM DIETHYL ETHER EXTRACT AND GC PROFILING
OF SOME IRANIAN *POLYGONUM* SPECIES.**

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In this study, the relationship among four species of *Polygonum* (including *P. hyrcanicum* (three samples), *P. persicaria*, *P. avicular*, and *P. hydropiper*) was investigated by GC profiling. Furthermore, the major compounds of the ethylic ether extract of *P. hyrcanicum* were identified by GC/MS as: α -bisabolol (17.5%), cedrol (15.9%), sesquisabinene hydrate (13.0%), α -elemol (10.5%) and trans-longipinocarveol (10.1%). All the identified compounds were sesquiterpenes and no monoterpene, fatty acid and /or hydrocarbone were detected in this extract. Chemical distances among the mentioned species were calculated in order to construct the dendrogram of closely related samples. Results indicated that the distance between two samples of *P. hyrcanicum* was considered to be short and their GC profiles were quite similar to each other also there was a close relationship between these two samples of *Polygonum* with *P. avicular*. The species *P. hydropiper* was observed far from two samples of *P. hyrcanicum* compare to other samples. Interestingly, *P. hyrcanicum*, gathered from Veresk, has not close relationship with other pairs of *P. hyrcanicum*. The results of this study supported the phylogenetic relationships among these *Polygonum* species which was previously reported.

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**EFFECTS OF SOWING DATE IN SPRING AND SUMMER, AND
VARIOUS AMOUNTS OF VERMICOMPOST ON GROWTH AND
YIELD OF FENUGREEK**

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Fenugreek is a medicinal plant of legume family that it sued as medicinal plant. To evaluate the effect of different amounts of vermicompost and sowing date on growth and yield of fenugreek, an experiment was conducted in the field trial of Razi University in Kermanshah during 1391. A split-plot experiment based on randomized complete block design were used with two planting dates (30th Ordibehesht and 30th Tir month) and 5 levels of vermicompost (0, 5, 10, or 15 metric tons per hectare and fertilizer treatments based on recommended amount) in three replications. Analysis of variance showed that plant height, number of leaves per plant, number of branches before flowering and after flowering, number of branches, fresh and dry yield per square meter was not significant under fertilizers, but plant height, number of leaves per plant and number of branches before flowering were significant under planting time. Plant height, number of leaves per plant and number of branches before flowering were significant in spring planting in compare to summer planting. In general dry and fresh yield was higher in spring planting than summer planting but there were not any differences. Results indicate that 15 T vericompost had equal value to complete fertilizer treatments requirement besides of safe production.

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**EFFECT OF SALT STRESS ON GERMINATION FACTORS OF LEMON
BALM (*MELISSA OFFICINALIS* L.)**

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Salinity of water and soil is an increasing problem in the world. Study of salt tolerance in medicinal plants is very important due to cultivation in saline lands. In order to study germination characteristics of Lemon balm (*Melissa officinalis* L.) in salinity stress condition, an experiment was carried out using a completely randomized design with three replications. Salinity levels included 0 (control), 25, 50, 75, 100, 125 and 150 mM NaCl. The effect of various salinity levels on germination factors was significant at 1%. Germination percentage and germination rate maximum obtained at concentration of 25 mM NaCl. Radicle and plumule lengths had the highest rate at 75 and 25 mM respectively. Fresh and dry weight of seedling showed maximum rate at 75mM. Seem that Lemon balm is relatively tolerant to salinity stress.



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**CHEMICAL COMPOSITION AND ANTIOXIDANT ACTIVITY OF
ESSENTIAL OILS OF THREE IRANIAN HERBS (APIACEAE FAMILY)**

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The phytochemicals have been found to act as antioxidants by scavenging free radicals, and many have therapeutic potential for free radical associated disorders [1]. It is well known that free radicals are the major cause of various chronic and degenerative diseases such as coronary heart disease, inflammation, stroke, diabetes mellitus and cancer [2]. *Heracleum lasiopetalum* Boiss., *Kelussia odoratissima* Mozaff. and *Ferulago angulata* (Schlecht.) Boiss (Apiaceae) have been utilized as culinary, spice and edible plants by Chaharmahali and Bakhtiari tribes, Iran [3]. This study was designed to examine the chemical composition and antioxidant activity of the essential oils of these herbs collected from Bakhtiari Zagros Mountains, Southwest Iran. The hydro-distilled essential oils of were analyzed by GC-MS, and also tested for antioxidant activity using DPPH assay. Forty-two compounds in the essential oil of *F. angulata* (Schlecht.) Boiss were identified. The major components were dominant among monoterpenes components. α -pinene, 1,8-cineole and *Z*-ligustilide were main components in the essential oil of *K. odoratissima* Mozaff aerial parts. Thirty-nine compounds were identified in the essential oil of *H. lasiopetalum* Boiss fruits. As a determined by GC and GC-MS analyses, *H. lasiopetalum* Boiss contained 2-ethylhexyl acetate, *n*-octanol and hexanol as the major compounds. The results showed that the three essential oils had high antioxidant activity.

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EFFECTS OF DROUGHT STRESS AND DIFFERENT NITROGEN LEVELS ON THE QUANTITATIVE AND QUALITATIVE YIELD OF BLACK CUMIN (*NIGELLA SATIVA* L.) IN SISTAN REGION

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Black Cumin (*Nigella sativa* L.) a member of the family Ranunculaceae is being used for edible and medicinal purposes in several countries of the world. To study effects of drought stress and nitrogen levels application on the quantitative and qualitative yield of this plant, an experiment was conducted at Zahak Agricultural Research station during 2010-2011 growing season. The experimental design was a split plot arrangement in RCBD with three replications. Four drought stress included; A1= normal irrigation (control), A2= stop irrigation from stem elongation to the start of flowering, A3= stop irrigation from flowering to the start of capsule formation and A4=stop irrigation in capsule formation and grain filling stages were assigned as main plots and four N levels (0, 30, 60 and 90Kg ha⁻¹) were randomized in sub plots. Analysis of variance showed that drought stress reduced yield, yield components and Fe content grain, but increased qualitative characteristics including essential oil, thymoquinone, oil, protein percent and grain mineral contents (N, K, P, Cu, Zn and Mn) significantly. Effect of nitrogen levels was significant on the all of quantitative and qualitative characteristics except harvest index, so that by increasing N application; plant height, branch number per plant, capsule number per plant, biological yield, grain number per plant, essential oil, oil, protein and nitrogen grain percent increased, but K, P, Zn and Mn grain content decreased. Meanwhile the most grain number per capsule, 1000- grain weight, grain yield, thymoquinone percent and Cu grain content were attained by 60 Kg ha⁻¹ N application whereas consumption of more fertilizer rate (90Kg ha⁻¹) had negative effects on these important traits. Interaction effect of drought stress × nitrogen levels was significant on the grain number per plant, essential oil, thymoquinone, oil, N, P, Cu, Zn, Fe and Mn grain content, but this effect wasn't significant for plant height, branch number per plant, capsule number per plant, grain number per capsule, grain and biological yield, harvest index, 1000- grain weight and K grain content. On the basis of these results, application of 60 Kg ha⁻¹ N under normal irrigation and under drought stress conditions in capsule formation and grain filling stages are respectively recommended for maximum yield grain and maximum active ingredients production.



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**EVALUATION OF FREE RADICAL SCAVENGING ACTIVITY OF
PLANT EXTRACTS AND ESSENTIAL OIL OF *MENTHA AQUATICA* L.**

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Essential oils and extracts from medicinal plants are regarded as natural food preservatives and health promoting drugs (1). The present study was aimed to evaluate antioxidation capacity of essential oil and different extracts (methanol, ethyl acetate) of *Mentha aquatica* via DPPH free radical scavenging activity (2).

The results showed the increasing the polarity of the solvent increases the antioxidant activity of extract. Antioxidant activity of methanolic extract is high so it can be used as an important source of antioxidation in medical and related industries; also ethyl acetate extract has antioxidant activity better than standard compound BHT. But the essential oil of this plant showed weak antioxidant activity.

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***ANALYSIS OF VOLATILE OIL COMPONENTS EXTRACTED BY SDE
TECHNIQUE AND ANTIOXIDANT ACTIVITY OF OILY COMPONENTS
OF "WATER MINT"***

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Mentha aquatica with generic name water mint is one of the oldest medicinal plants which its traditional derivatives including tailed, distillate and even dried leaves of it have been widely used in Iranian food and medicine. In this study, the essential oil of *M. aquatica* was extracted using SDE technique (simultaneous steam distillation solvent extraction) by *n*-hexane as solvent for the first time. The obtained essential oil was analyzed using GC-Mass and its components were identified. A total of 24 compounds were identified in the essential oil that makes up 89.1 percent of the whole. D- Carvone (29.5 percent), Eucalyptol (14.6%), Benzofuran (9.5%) and Menthofuran (8.3 percent) were the major constituents. Antioxidant activity of the oily compounds was measured via DPPH free radical scavenging activity (2). The results indicate that the extract of the non-polar extraction solvent (*n*-hexane) significantly inhibited compared with the standard BHT.

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ANALYSIS OF THE ESSENTIAL OIL COMPONENTS OF *MENTHA AQUATICA* L. COLLECTED IN TEHRAN PROVINCE

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Mentha aquatica is one of the species of mint plant. This plant can be found in Hamedan, Kurdistan, Kermanshah and humidity parts of Iran. In this study essential oil of *Mentha aquatica* L. of Tehran province, extracted by hydrodistillation method and its constituents were identified using gas chromatography mass spectrometry. Twenty compounds consisting 92.9% of the total components were identified from the oil obtained. Among those, Carvone (43.7%) and Eucalyptol (26.4%) were the major oil components, so the oil can introduce with high amounts of oxygen-containing compounds. The type and percentage of extracted compounds, as well as the main constituents of the essential oil of this plant has significant differences with the same species from India and other parts of Iran [2]. As valuable usage of Carvone, this sample can be considered as a suitable resource for preparation of this material.

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**CHANGES IN OIL YIELD AND CHEMICAL COMPONENTS OF THE
ESSENTIAL OIL OF *SATUREJA BACHTIARICA* BUNGE UNDER FIVE
DRYING METHODS**

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Satureja bachtiarica Bunge (locally name: “Marzeh-e-Bakhtiari”) is well-known aromatic plant which is frequently used as flavouring agents in meat and as traditional medicinal herbs in Iran [1]. *S. bachtiarica* Bunge essential oil contains mainly monoterpenes and sesquiterpenes [2, 3]. Drying process increases the shelf life by slowing microorganisms’ growth and preventing certain biochemical reactions that might alter the organoleptic characteristics [4]. The aerial parts of *S. bachtiarica* Bunge. were dried by five drying methods including: sun-drying, shade-drying, oven-drying at 45 °C and 65 °C and freeze-drying. The essential oils of fresh and dried samples were obtained by hydro-distillation and, were analyzed by using gas chromatography-mass spectrometry (GC-MS). The highest essential oil yields were obtained by oven-drying at 45 °C. The main components in essential oils of fresh and dried *S. bachtiarica* Bunge. aerial parts were carvacrol (31.2-42.2%), γ -terpinene (10.9-18.3%), thymol (11.7-19.4%) and p-cymene (8.2-14.1%). In finally, drying of aerial parts of *S. bachtiarica* Bunge. In the oven at 45°C is most suitable and is recommended for fast drying and high-oil yield.

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EFFECTS OF COLD STRESS AND SEED SCRATCHING ON SEED GERMINATION AND SOME GROWTH RELATED CHARACTERISTICS OF WILD PISTACHIO (*PISTACIA ATLANTICA* DESF.)

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Seed germination and growth of primary seedlings of wild piatachio (*Pistacia atlantica*) occur unsatisfactorily in normal conditions due to the hard coating of seeds. To study the effects of seed scratching and cold stress on seed germination and some growth related characteristics of wild pistachio, an experiment was carried out in laboratory conditions at Seed and Plant Improvement Institute in 2012. Four treatments of cold durations (5, 10, 15 and 20 days maintenance of seeds) were examined on healthy and scratched seeds. In each treatment, 400 seeds of wild pistachio, in four replications, were placed on wet filter papers in petri dishes and maintained in refrigerator at 5°C for the mentioned durations. At the end of each maintenance period seed germination percentage of each treatment was determined and seeds were soil in pots. Ten day after planting, length, fresh weight and dry weight of seedlings root and stems were measured. Scratched and healthy seeds maintained in laboratory conditions were considered as cheks for each treatment. Analysis of variance of data showed significant differences at 5% probability level among treatments for all measured characteristics. Seed scratching increased seed Germination percentage. In healthy seeds maintain in normal conditions (check treatment) seed germination percentage was low and occasionally produced seedlings were weak and had no further growth. In scratched seed germination and seedlings growth were much better. Cold treatments increased seed germination in both healthy and scratched seeds, but its effects on scratched seeds were higher than on healthy seeds. The highest seed germination occurred in 10 and 15 days cold treatments. Cold had also a positive effect on seedlings growth. In healthy seeds, the highest values of length, fresh weight and dry weight of seedlings stem (8.28 cm, 17.49 g and 16.01 g, respectively) and seedlings roots (4.27 cm, 10.91 g and 7.56 g respectively) were obtained in 10 days cold treatment. In scratched seeds, the highest values of stems traits (4.05 cm, 2.16 g and 0.44 g, respectively) belonged to 15 days cold treatment and values of root traits (4.63 cm, 0.83 g and 0.17 g, respectively) belonged to 10 days cold treatment. Seed scratching had negative effects on seedlings growth after germination. Length, fresh weight and dry weight of stems and roots of seedlings in all cold treatment of scratched seeds were significantly lower than those of healthy seeds. Generally, the results of the present study showed that although seed scratching could increase percent of seed germination, but it decreased the further growth of seedlings. Cold stress for 10 and 15 days alone increased both seed germination and seedlings growth.



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**EVALUATION OF MEDICAL AND PHARMACEUTICAL EFFECTS OF
EXTRACT BARK OF TREE SPECIES BEECH, SPRUCE AND OAK**

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Plants are a rich source of phenolic compounds, which are the most important natural antioxidants [1]. Despite the abundance of three species of beech, spruce and oak, in Iran, the antioxidant potential of phenolic compounds is unknown in bark trees. Consumption of antioxidant compounds derivative of plants can reduce the incidence of many chronic diseases [2]. The purpose of this study was to measure the amount of phenol and total flavonoid by spectrophotometric method and evaluation of antioxidant activity of acetone extracts of the skin of three species beech, spruce and oak, Using three diphenyl Pycryl Hydrazyl methods based on inhibition of free radical production percentage and power of regenerating and trapping nitric oxide. The results showed that the highest amount of phenol and total flavonoids was found in spruce bark. Test results of trapping diphenyl Pycryl Hydrazyl free radical showed that inhibitory concentration of 50% acetone extract of the bark of beech, spruce and oak, was respectively, 19/92, 0/4 and 7/33 micrograms per milliliter. Also regenerative power of rush extracts was more than the other two species. By trapping nitric oxide test, inhibitory concentration 50% in beech acetone extract 23/98, spruce extracts 67 and oak extract 90/92 micrograms per milliliter was calculated. Acetone extract of the bark of three models studied showed different levels of antioxidant activity.

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CALLUS INDUCTION EVALUATION OF TWO IRANIAN NATIVE
SEASHORE IRIS SUBSPECIES, USING DIFFERENT EXPLANTS
THROUGH *IN VITRO* CULTURE

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Iris spuria is a member of the *Iris* genus that widely used for ornamental and medicinal purposes. *Iris* propagates by using both sexual (seed) and asexual (rhizomes) methods. Tissue culture techniques are usually used for commercial production of pathogen-free plants and to protect rare species under the risk. In present study, callus induction was achieved using rhizome sections, leaf base, stem nodes, lower, middle and upper part of ovary and flower base of two subspecies of the Iranian endemic *Iris spuria* subsp. *musulmanica* and *I. spuria* subsp. *halophila*. Callus induction medium was Murashig and Scoog (MS) supplemented with different concentration of (0, 0.5, 1, 2, 4, 10 mg/l) 2,4- Dichlorophenoxyacetic acid (2,4-D) , (0, 0.1, 0.5 mg/l) Kinetin (KIN) , (0, 0.2, 0.5, 1, 2, 3, 5 mg/l) Banzyl Adenin (BA) and (0, 0.1, 0.5, 0.9, 1, 2.5, 5 mg/l) 1-Naphthalene Acetic Acid (NAA). After eight weeks callus induction only occurred in leaf base, stem nodes and flower base explants but other explants showed no response to treatments. The highest percentage of callus, was obtained from flower base in (5mg/l)(BA+ NAA), from *I. musulmanica* and then *I. halophila* (respectively, 72% and 66.8). the greatest size of callus was observed from flower base in (2.5 mg/l)NAA+(0.5mg/l) KIN in *I. musulmanica* then *I. halophila* (respectively, 49.4 , 47.6 mm²). In the present study, younger explants derived flower base, showed a positive response to callus induction and compared with other explants (leaf base and stem nodes) produced a greater percentage of callus and size of callus was also larger.



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**EFFECT OF DROUGHT STRESS IN DIFFERENT GROWTH STAGES
ON SOME OF MORPHOLOGICAL TRAITS OF PEPPERMINT
(MENTHA PIPERIT L.)**

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In order to determine the effects of water deficit at different growth stages on some morphological characteristic of peppermint as Ispilt polot randomized complete block design with three replications at the agronomy research from faculty of agriculture, Islamic Azad university of Tabriz in 1389 was implemented. Treatments in this experiment is the first factor with four levels of water stress (50, 80, 110, 140 mm) evaporation the basin based class A , in plant height , leaf dry weight , stem dry weight , oil yield per plant , dry weight per plant , the second factor during stress (plant growth stage) 1=height 20 cm, 2=50% flowering 3= flowering was completed. Based on the results of this review in the third growth stage (full flowering) and fourth irrigation (140 mm) leads to an increase in dry weight of leaf and stem characteristics, yield and oil content in plant dry weight per plant was compared to the other stages.

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**EFFECT OF OSMOPRIMING ON SEED GERMINATION OF OSIMUM
BASILICUM UNDER DROUGHT STRESSES**

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Salinity is one of the environmental factors that has a critical influence on the germination of seeds and plant establishment. Drought affects imbibition, germination and root elongation. This experiment was conducted to determine the effect of osmopriming on germination of basil under salinity condition. The treatments were drought (0, -3, -6, -9, -12 and -15 mM) and osmopriming combination of osmotic potential of polyethylene glycol (PEG) with two levels (-12 and -15 bar) and duration of priming with two levels (24 and 48 h). Finally, we can claim that positive effects of osmopriming relates to the suitable and efficient osmosis regulation of priming derived plants compared with unprimed counterparts. Ultimately, this trend led to an increased salinity tolerance of plants.

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CHEMICAL CONSTITUTES OF THE ESSENTIAL OIL OF *ARTEMISIA AUCHERI* BOISS FROM HIGH ALTITUDE OF CHAHARMAHAL VA BAKHTIARI

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The genus *Artemisia*, with the common Persian name of ‘dermane’, includes 34 species that are found wild all over Iran. The main constituents of *A. aucheri* Boiss oil from north of Iran (Semnan) were reported to be verbenone (21.5%), camphor (21.0%) 1,8-cineole (8.3%) and *trans*-verbenol (8.1%) [2]. Result of other study showed that the main constituents of *A. aucheri* Boiss oil were camphor (45.5%) and 1,8-cineole (14.3%) [3]. Hydro-distilled essential oil of *A. aucheri* Boiss inflorescences collected from alpine area of Zagros Mountains, Kallar (2700-3000 meters above sea level) in Chaharmahal va Bakhtiari province, Southwest of Iran, were analyzed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). The major constituents of essential oil of *A. aucheri* Boiss inflorescences were artemisia ketone (51.3%), nerolidol (7.1%) and artemesia alcohol (3.5%). Acyclic monoterpenoids such as artemisia ketone C₁₀H₁₆O (Figure 1) are the major constituents of the essential oil in *A. annua* [3].

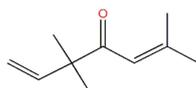


Figure 1 Chemical structure of artemisia ketone

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**STUDY OF EFFECTS ON WOUNDS HEALING OF RHUBARB
EXTRACT IN RAT**

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Despite numerous reports on anti-bacterial, vascular astringent and protective mucous layer of Rhubarb extracts, no research about the effects of this plant on wound healing incision has been made. Also there ever been proven natural ingredients than chemicals with less harmful are aim current study. In this study 75 male rats were used. The Rats were randomly divided into three groups: false control, control and treatment groups. With incision wounds to 1.5 cm long and deep dermis parts of the midline behind Para vertebral Rat were created. for the False control group received no treatment, control group received Cold topical cream twice daily until the start of the experiment, and group therapy the Rhubarb extract Similarly received. Effects of Rhubarb extracts on healed regions evaluated by t-test and pathological studies. Average percentage of wound healing in the false control and control groups, in the third, sixth, ninth, twelfth and fifteenth days whit the Rhubarb extract was changed significant differences ($P < 0 / 05$).

Pathologic findings of specimens obtained from control and treatment cases in terms of histologic, suggests a similar qualitative trend rate of healing, cell mobilization and clearing the ulcer area according to the healing time the specimens. Findings showed that the Rhubarb extract caused wound healing is in the early days. Find glycoside, tannin and rein of Rhubarb extract in the membrane proteins in epithelial cells of the skin reacts stronger to be connected. Also Rhubarb extracts properties due to increased contraction of epithelial cells and epithelial cell adhesion to the wound edge over each other in treatment samples.

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**LOCAL EFFECT OF EUGENOL OIL ON THE SKIN WOUND HEALING
IN RAT**

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One of the most important issues that science and veterinary medicine has been faced with the issue is the treatment of wounds. Variety of synthetic drugs has long been the more chemicals are introduced to accelerate the healing process and have been used, which unfortunately most of them have side effects are numerous. To determine the effect of clove extract on topical skin wound healing in rat was conducted.

In this experimental were study 60 male rats. The mice were randomly divided into control and treatment groups were divided. Shear length and 2 cm thick dermis on the back of the animals under topical anesthesia was induced with Lidocaine. For the control group received no treatment, treatment groups, received Eugenol oil twice daily until the start of the experiment. Calculate the percentage of wound healing, wound length measured on days 2, 6, 10, 14, 18, 22 after cut wounds and pathological study of wound healing complete. Eugenol on the process and reduce shrinkage during wound healing and it has no positive effect and while this material could reduce the number of Neutrophils ($p < 0 / 05$) and Increase the number of Eosinophils ($P < 0 / 05$).

Effect of Eugenol oil on the reduction inflammation and tissue repair time reduction compared to control was significant. This combination due to phenolic substances in their antibacterial properties and also the regulatory process is inflammation. Also reduced Neutrophils by reducing the severity of inflammation in the inflammatory phase are restored. Reduces the inflammatory phase is caused reduces wound healing time. Eugenol an effective role on quality alone is healing process. But reduce the length of the wound, the expected effect does not show us.

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**COMPARISON OF CARVACROL LEVEL AND ANTIBACTERIAL
PROPERTIES OF INDUSTRIAL AND LABORATORY EXTRACTED
ESSENTIAL OILS OF THE WILD AND CULTIVATED *SATUREJA
KHUZESTANICA***

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Satureja khuzestanica has numerous proven biological properties. This study was carried out to determine the amount of carvacrol in the industrial and laboratory essential oils of the wild and cultivated *Satureja khuzestanica*, and investigate their antibacterial properties. The essential oil of the cultivated *Satureja khuzestanica* was prepared industrially in the Khoraman Pharmaceutical Company, and the essential oils of the cultivated and wild *Satureja khuzestanica* were extracted in the laboratory using the hydrodistillation method. Identifying and determining the amount of carvacrol were performed using the gas chromatography (GC) equipment. The microbroth dilution method was applied to evaluate the antibacterial properties of the essential oils.

Carvacrol was the main component of the plant, and its amounts were found to be 96.9% (the highest level of carvacrol reported so far) for the essential oil of the wild *Satureja khuzestanica* taken in the laboratory, 90.6% for the essential oil of the cultivated *Satureja khuzestanica* extracted in the laboratory, and 81.47% for the essential oil of the cultivated *Satureja khuzestanica* prepared industrially. It was also found that the essential oil of this plant has remarkable antibacterial effects on standard bacteria, particularly on resistant *Staphylococcus aureus*. These results suggest that *Satureja khuzestanica* is rich in phenolic compounds and has antioxidant properties as well. Therefore, it can be used as a useful herbal source in food and drug industries.



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**EFFECT OF PHYTOHORMONES ON COMPOSITION OF
SAMBUCUS NIGRA L. ESSENTIAL OIL**

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Plant hormones are a group of chemically diverse molecules that control virtually all aspects of plant development. In this study the effects of growth hormones (NAA & GA₃) on essential oil of *Sambucus nigra* L. were evaluated. The composition of the essential oil was analyzed by GC and GC-MS. 47 constituents were identified in plant oil. Some detected compounds can be responsible for the plants biological and/ or toxic activities. Results indicate that NAA and GA₃ have significant effect on the concentration of essential oil. Many components were increased and some of them decrease significantly. In some cases, the compounds were eradicated of induced completely. It seems a useful method for changing the concentration of the essential oil compounds.

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**OLEUROPEIN EXTRACTED FROM OLIVE TREE LEAVES
MACERATION AND SOXHLET METHOD AND MEASURED WITH
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY**

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The polyphenolic compounds in olive oil are hydroxytyrosol and tyrosol, with oleuropein present in minor quantities and mainly found in the olive itself. Olive oil, oleuropein, and its derivatives have a variety of biochemical roles, including antiinflammatory effects, antithrombic actions, prevention of LDL oxidation and platelet aggregation, antihyperglycemic activity, and antiischemic and hypolipidemic, antimicrobial, and antiviral. Oleuropein is a glycoside that is the main chemical compound found in olive plants. Olive leaves are the main source. Oleuropein is owned by phenolic compounds. These factors combine olive fruit is bitter.

The oleuropein used in this study was isolated from *Olea europaea* leaves. Air-dried and pulverized leaves were extracted by mechanical stirring for 12 h with acetone. The extract was evaporated completely and washed with a mixture of CH₂Cl₂: methanol: 98/2. The insoluble material was separated. Oleuropein isolation and HPLC conditions the oleuropein was isolated from *Olea europaea* leaves according to the method as described previously. In brief, air-dried and pulverized leaves were extracted by mechanical stirring for 12 h with acetone. The extract was evaporated to dryness and the residue washed with a mixture of CH₂Cl₂/methanol: 98/2. The insoluble material (650 g) was separated, dried and subjected to medium pressure liquid chromatography with Si gel 60 Merck (15–40 μm), using CH₂Cl₂-methanol gradient as the eluent to extract pure oleuropein (260 g). Analytical reversed phase high performance liquid chromatography (Shimadzu, LC-10AD VP, Japan) with a UV-Vis detector (SPD- 10AVP) and reverse phase column: RP-18, 250 × 4.6 mm, 5 μm, was used in this study. A mixture of distilled water containing orthophosphoric acid, pH = 2.9 and acetonitrile with the ratio of 70/30 (v/v), and flow rate: 1.2 ml/min was used as mobile phase. The temperature of the column was maintained at 30 °C by a column oven (CTO-10AS VP). The solutes were detected at 254 nm with injection volume 20 μl and purity of oleuropein was found to be 94%. The purified oleuropein in compare to the standard oleuropein (INDOFINE Chemical Company, Hillsborough, NJ, USA) was entirely in the glucoside form and was free of any aglycone forms (same retention time, RT = 5 min). Based on these results, the method of Maceration Oleuropein 63.698% and Soxhlet in 22.85 percent was reported.



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**THE EFFECT OF SALINITY STRESS FROM NaCl ON
SEEDLING GROWTH OF *DOCROSIA ANETHIFOLIA* HERB IN
HYDROPONIC IRRIGATION CONDITION AND DETERMINATION
ITS SALINITY TOLERANCE THRESHOLD**

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Soil and water salinity, as environmental stressors, factors reduce water absorption by roots and cause trouble nutritional and metabolic processes of the plants. An experiment was carried out in a complete randomized design with six replications to investigate the effect of salinity stress from NaCl on seedling growth stage of *Docrosia anethifolia* in hydroponic irrigation condition and its salinity tolerance threshold. For this purpose, germinated seeds were transferred to hydroponic culture and were imposed on them salt concentrations: zero (control), 50, 100, 200, 300 and 400 mM and were calculated 8 different parameters of growth. With increasing salinity between control and other five treatments, shoot length and root length reduced but weren't significant differences (at level 0.01 percent). Also, shoot/root ratio difference was not significant between treatments and control. But the shoot fresh weight and the root fresh weight reduced significantly in 400 mM treatments and shoot dry weight, the root dry weight and biomass were reduced significantly in treatments of 200, 300 and 400 mM.

Totally, *Docrosia anethifolia* in the seedling growth stage is few-sensitive to salinity and with increasing salinity (especially quantities 200 mM and upper) reduce the indicators of dependent of weight (the fresh and dry weight of shoot and root and biomass) but indicators of dependent of length no reduce significantly. Also, sensitivity to salinity of this plant is similar between root and shoot. salt tolerance threshold was determined 100 mM in this experiment, so recommend that this plant irrigate in the seedling growth stage with water that its salinity below 100 mM.

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**INVESTIGATION OF IN VITRO APOCAROTINOID GENE
EXPRESSION IN PERIANTH OF SAFFRON (*CROCUS SATIVUS*) IRAN**

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Saffron (*Crocus sativus L.*) is a triploid, sterile, monocot plant belongs to the family Iridaceae, sub family Crocoideae. *C. sativus* only bloom once a year and should be collected within a very short duration, the stigmas of Saffron flowers are harvested manually and subjected to desiccation then have been used as a spice. It has been also used as a drug to treat tumor, cancer, chronic uterine hemorrhage, insomnia, scarlet fever, small pox, colds and cardiovascular disorders. It has been shown that saffron is a protective agent against chromosomal damage. Saffron has been vegetative propagated by corm, each mother corm produce 7-8 cormlet each year. The main colors of saffron, crocetin and crocetin glycosides, and the main flavors, picrocrocin, Safranal is the main component of aroma and it's bitter taste is related to Glycoside picrocrocin that are derived from the oxidative cleavage of the carotenoid zeaxanthin which cleavage by zeaxanthin cleavage dioxygenase (ZCD). We investigated gene expression of ZCD in vitro by using tissue culture of perianth obtained from immature flora buds of Ghaen, Mardabad and Shahrood, Iran, on MS medium supplemented by 10 mg/L NAA and BAP. RNA of each sample was extracted using RNx method; followed by RT-PCR techniques. The results indicated that ZCD was present in perianth of all cultured samples of mentioned areas. Investigation of this pathway which controls the saffron apocarotenoid pigments in perianth is important to produce saffron with high quality and quantity. The results showed that the expression of ZCD in perianth whether through mevalonic acid or non-mevalonic acid needs more investigation.

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**EFFECT OF HEIGHT ON HYPERICIN CONTENT OF
ST. JOHN'S WORT**

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Hypericum perforatum L. or St. John's wort is an important medicinal plant, which its secondary metabolites, hypericin and hyperforin have several medicinal effects such as antidepressant, antiviral and antibacterial. This study was carried out for studying the effects of height on the Hypericin content [1]. For sample collecting, this area was divided to six classes consist of: 1) 1100-1300, 2) 1300-1500, 3) 1500-1700, 4) 1700-1900, 5) 1900-2100, 6) 2100-2300 meter. Plant samples were harvested from top of plants (20-25 cm) in flowering stage. The hypericin content was determined by spectrophotometer at 590 nm and the $C=E \times 100 / K \times g$ equation [2]. Results shown hypericin content in this area was varied by altitude variations, doesn't have a significant correlation with the altitude. The highest content of hypericin was obtained from 1900-2100 meter (0.105 mg/g) and its lowest obtained in 1500-1700 meter (0.02 mg/g). These results suggested that there is a class of altitude in each area which is suitable for *Hypericum* growth and more hypericin yield.

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**EFFECT OF *ELAEGNUS ANGUSTIFOLIA* L. HYDROETHANOLIC
LEAF EXTRACT ON SERUM TRIGLYCERIDES, LDL, HDL AND
TOTAL CHOLESTEROL OF MALE RATS**

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Hyperlipidemia is one of risk factor in cardiovascular diseases. The herbal medicine was used for treatment in some disorders. Hypolipidemic effects of *Elaeagnus angustifolia* L. were reported. In this study the *Elaeagnus angustifolia* Hcl leaf extract was prepared and its effects on HDL, LDL, VLDL & TG serum levels in male rats were investigated. The 40 male rats (220-270 gr) were divided in four groups (control, sham, lovastatine and test) randomly and fed by hyperlipidemic diet (20% sheep oil) for 5 weeks. The sham group were treated with saline, lovastatine group were treated with lovastatine orally (20mg/kg, gavage) and the test groups were induced with *Elaeagnus angustifolia* extract 40% (300mg/kg, IP) daily for 1 week. The blood samples were collected from heart directly and serums were separated for lipid analysis after 12hr fasting. The data were analyzed with SPSS and ANOVA and differences between them with $P < 0.05$ were significant. The data showed that the feeding animals with hyperlipidemic diet was increased weight animals and was caused hyperlipidemia in serum. The *Elaeagnus angustifolia* leaf Hcl extract has hypolipidemic effect on serum VLDL, LDL, Chol. TG and increase HDL in male rat.



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**THE INVESTIGATION OF THE SOME CHEMICAL COMPONENTS OF
VOLATILE OIL OF FOUR SPECIES MINT LEAVES IN THE VARIOUS
GROWTH STAGES**

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The various species of the mint have the unique medical effects and also have many utilities on the food and health care industries and have utilized for many years by man. Menthol and Menthon are the main component among the existing components in the volatile oil of the mint. For studying of the chemical characteristics of the volatile oil of two imported species (*M. arvensis* and *M. piperita*) and two local species (from Ege and Eskişehir area in Turkey) of mint an experiment was performed in the experiment field of the AgricultureFaculty of Çukurova University on the “Before Flowering”, “Flowering” and “After Flowering” stages and specifying the best harvesting time in split plot design based randomized complete block with four replications. In this experiment the various species of the mint were considered as the main factors and the various growth stages as the sub-factors. After extracting the plants dried leaves volatile oil by Clevenger apparatus, the volatile oil components were analyzed by using the GC and GS-MS. The results showed that the quantity of the menthol of *M. arvensis* as a main component in volatile oil of the mint species was more than the other three species. Also, during the flowering time, rate of the menthol and menthon of the volatile oil was more than the other stages, which is the best time for mint harvesting in various cutting.



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ANTIFUNGAL ACTIVITY OF THE ESSENTIAL OIL OF
SALVIA VIRGATA

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Salvia genus belongs to the subfamily Nepetoideae of Mentaceae tribe in Lamiaceae family. This genus is represented in the Iran flora by 58 species. The aerial parts of these genus was widely used as medicinal and food usage. Essential oil composition of *Salvia virgata* L. was obtained from aerial parts of this plant by hydro-distillation method by cleverger type apparatus and analyzed by GC & GC/MS. Twenty nine components were identified in the essential oil of *S. virgata* that represented 98.81% of the oil. The main components of essential oil of *S. virgata* were, Caryophyllene oxide (30.23%), β - Caryophyllene (22.63%), Sabinene (11.82%), 1-Octen -3-ol (6.64%) and α -tujene (6.24%), the yield of essential oil of *Salvia virgata* was calculated 2.01%. Antifungal properties of the essential oil was evaluated by disk diffusion and well diffusion methods against *Alternaria alternata* (PTCC 5224) and *Penicillium funiculosum* (PTCC 5301) and (PTCC 5169). The oil showed good antifungal activity against *Penicillium funiculosum* compared standard antibiotics. Also the results indicate that, Well diffusion method is more accurate than the disk diffusion method [1, 2].

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**EVALUATION OF THE EFFECT OF ORGANIC FERTILIZERS AND
MULCH APPLICATION ON GROWTH, DEVELOPMENT, ESSENTIAL
OIL CONTENT, AND MICROBIAL LOAD IN PEPPERMINT
(*MENTHA PIPERITA* L.)**

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Today in medicinal plants culture, organic culture is noticeable because of undesirable effects of chemical fertilizers. Another important problem about medicinal plants is microbial quality, so it is necessary to evaluate utilization of organic culture on microbial contamination of medicinal plants. This experiment about peppermint culture was set up as split plot on the basis of randomized complete block design with 8 treatments and 3 replications. The utilization of organic compounds as a main factor included: 1-untreated control, 2-urban compost applying, 3-organic manure applying, and 4-organic manure applying with wood chips mulch, and harvest as a sub factor included two harvest were used. Morphological traits, essential oil content and yield, and microbial contamination, were measured and compared in each treatment according to the standard guidelines. Result of means comparison ($p < 0.05$) indicates that the utilization of organic fertilizers and matter increased growth and development indexes, yield, and essential oil content and yield, so that total herb yield and essential oil yield on two harvest were at maximum level in organic manure applied plots (472.2 g/m^2 and 14.5 ml/m^2 respectively), these enhancements were more significant in first harvest. In terms of microbial contamination, none of the fertilizer treatments increased microbial contamination in first harvest, and application of mulch could decrease microbial load significantly. In second harvest, organic fertilizers especially organic manure, only increased mesophilic aerobic bacterial contamination. According to microbial quality standards all the samples were standard in mesophilic aerobic bacterial contamination for pretreated consumption. The samples of first harvest and just the compost fertilized samples of second harvest were standard in coliforms contamination for pretreated consumption and only the compost fertilized and mulch treated samples of first harvest were suitable for crude consumption. None of the samples were standard in mold and yeast contamination for any consumption. Totally although increasing mesophilic load in first harvest, organic fertilizers caused peppermint yield and essential oil content enhancement and mulch could decrease microbial load. First harvest not only was better in yield, but also was in more desirable condition for consumption in microbial quality.

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**THE COMPARISON GC AND GC-MS OF *ALLIUM AMPELOPRASUM*
L. VAR, *ATROVIOLACEUM* REGEL AND *ALLIUM IRANICUM*
WENDELBO (WENDELBO)**

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The subgenus *Allium* section includes economically and medically important species, such as garlic and leek as well as other polyploid minor crops. In this study essential oil of *Allium ampeloprasum* l. var *atroviolaceum* was examined by GC and GC-MS. In the essential oil of *A. ampeloprasum* 22 compounds have been identified. d-limonene (26.977 %), Beta-pinene (25.309 %), Trans-caryophyllene (7.390 %), Elemene (0.835 %), Caryophyllene oxide (1.205 %), Dimethyl trisulfid (2.432 %), Dimethyl tetrasulfide (0.729 %), Alpha-pinene (0.524 %), Gamma terpinene (0.449 %), Alpha-terpineol (0.241 %), Beta-myrcene (0.35 %), Farnesene (0.304 %), Camphene (0.037 %), Ethanone 1-(4-methylphenyl) (0.219 %), 2,5-diethyl phenol (0.416 %), 4-methylbetamethylenebenzeneethanthiol (0.099 %), Hexadecanoic acid (14.917 %), 9-octadecanoic acid (17.343 %), 1-heptadecane (0.57 %), tetra decane (0.101 %), 7-hydroxycadalene (0.103 %), Cymene (0.151 %), were the main component of essential oil. The essential oil of *Allium iranicum* 9 compounds has been identified. Beta-pinene (49.96 %), dimethyl-Trisulfide (15.82 %), L-Limonene (12.10 %), Trans-Caryophyllene (5.49 %), Santoline Triene (1.27 %), dimethyl-tetrasulfide (1.32 %), Alpha-pinene (0.69 %), hexadecadienoic acid (5.99 %), 9,12-Octadecadienoic acid (5.83 %), were the main component. So it two species are high similar due identical chemical compounds.

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IN VITRO ANTIMICROBIAL ACTIVITY OF
ALLIUM AMPELOPRASUM L. VAR *ATROVIOLACEUM* REGEL

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Some aromatic plants such as *Allium* are used for medical purposes. In the essential oil of aromatic plants, there are many compounds such as monoterpenes, sesquiterpenes, alcohols, aldehydes, phenols, esters, and ether, sulphurous and nitrogenous substances. In this study, the essential oil of the aerial part of *Allium ampeloprasum* l. var, *atroviolaceum* was examined by GC and GC-MS. In the essential oil of *A. ampeloprasum* 22 compounds have been identified. d-limonene (26.977 %), Beta-pinene (25.309 %), Trans-caryophyllene (7.390 %), Elemene (0.835 %), Caryophyllene oxide (1.205 %), Dimethyl trisulfid (2.432 %), Dimethyl tetrasulphide (0.729 %), Alpha-pinene (0.524 %), Gamma terpinene (0.449 %), Alpha-terpineol (0.241 %), Beta-myrcene (0.35 %), Farnesene (0.304 %), Camphene (0.037 %), Ethanone 1-(4-methylphenyl) (0.219%), 2,5-diethyl phenol (0.416%), 4-methylbetamethylenebenzeneethanthiol (0.099 %), Hexadecanoic acid (14.917 %), 9-octadecanoic acid (17.343 %), 1-heptadecane (0.57 %), tetra decane (0.101 %), 7-hydroxycadalene (0.103 %), Cymene (0.151 %), were the main component of essential oil. The ethyl acetate extract showed greatest antimicrobial activity against *Klebsiella pneumonia* (250 µgr/ml) and *Shigella flexenry* (250 µgr/ml). In conclusion we suggest antimicrobial activity of *Allium iranicum* may be due to its content of pinene and phenol.



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EFFECT OF METHANOL AND NANO-IRON CHELATED FERTILIZER APPLICATION ON ACTIVITY OF POLYPHENOL OXIDASE, GLUTATHIONE PEROXIDASE AND ESSENTIAL OILS CONTENT IN BASIL (*OCIMUM BASILICUM* L.)

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Medicinal plants are an important part of the world economy in respect of crop production. These plants include many species and cultivars that contain the active ingredient and can be used in treatment of diseases. The secondary metabolites that are produced by plants, in addition to the pharmaceutical industry are used in other industries including the food, cosmetics, health, color industry and etc. Basil (*Ocimum basilicum* L.) has many medicinal properties including appetizer, anti-parasite, diuretic, carminative, expectorant, stimulant and etc. To evaluate the effect of methanol and nano particles of iron chelated fertilizers on enzyme activity of polyphenol oxidase and glutathione peroxidase and essential oil content of basil, this experiment was done on factorial experiment base of in randomized complete blocks design with three replications at Institute of Medicinal Plants (IMP), ACECR. The treatments were methanol with five levels (0, 10, 20, 30 and 40% V/V) and nano-iron chelates with four levels (0, 0.5, 1 and 1.5 g.L⁻¹). The results showed that the interaction between methanol and nano-iron fertilizer had significant effect ($p < 0.01$) on enzyme activity of polyphenol oxidase, glutathione peroxidase and essential oil content. The highest polyphenol oxidase activity was related to interaction of 20% methanol and 1.5 g.L⁻¹ nano-iron chelated fertilizer. The maximum activity of glutathione peroxidase and also the highest content of essential oil were observed in treatment of 40% methanol and nano-iron chelated fertilizer. Generally, methanol and nano-iron chelated can increase the enzyme activity of polyphenol oxidase, glutathione peroxidase and also essential oil content of basil.

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**DITERPENE COMPOUNDS IN ESSENTIAL OILS OF
*JUNIPERUSEXCELSA***

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The genus *Juniperus* (Cupressaceae) contains more than 60 species is quite widespread in the northern hemisphere. *Juniperus excelsa* grows on the mountainous regions of Iran [2]. *J. excelsa* is an evergreen tree occasionally a shrub or a prostrate shrub from Cupressaceae. Its Persian name is «Arduj». *J. excelsa* is a dioecious tree to 6-7 m tall or a low shrub with a dense head. This species is found in Afghanistan, Iran, Armenia, Turkey, Turkmenia, India, Uzbekistan, Pakistan, Oman and Saudi Arabia [1]. *J. excelsa* is a medicinal plant and traditionally used for dysmenorrhea, cough, bronchitis and common cold, jaundice and tuberculosis and to induce menses and expel fetus [1, 3]. The aim of this research was to extract and measure the terpenoids composition of oils of fruits and aerial parts of the plant *J. excelsa* which are collected from the North Highlands located in the Mazandaran province. In this study, the components of *J. excelsa* (fruits and aerial parts), collected from the North Highlands Alborz Mountains indeed Hezar-Jarib Behshahr in Mazandaran province, and after extraction essential oils by a Clevenger apparatus, their compounds analysis and identifies by GC / MS. *the volatile oil samples obtained from the fruits and leaves of J. excelsa* were clear and possessed a strong odor. They were colorless and yielded 1.66% and 1.61% (w/w) of volatile oil respectively. Respectively, in the oils from leaves and fruits 48 and 47 compounds were identified. The main compounds both oils of leaves and fruits were α -pinene (50.35% and 31.14%), sabinene (8.17% and 14.18%) and elemol (6.68% and 10.01%) respectively. However γ -terpinene (8.95%) and germacrene D-4-ol (7.15%) were also other of the major components of *J. excelsa* leaves. Also 12 and 4 compounds by total area of 14% and 2.09% were identified in the oils of fruits and leaves, respectively, were diterpenes. The major diterpene components in the oils of both leaves and fruits of this plant were Abietadiene (0.78% and 2.41%) and 4-epi-Abietal (0.74% and 0.93%) respectively. Several reports published about the main *constituents of the leaves' and fruits' oils obtained from J. excelsa*. The results of this study did not entirely correspond with the published data. Also detection of diterpenes in the oils were the important keys of this research, because usually these weights compounds only seen in extract by other solvents and other methods.

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**IN VIVO EFFECT OF *MELISSA OFFICINALIS* ESSENTIAL OIL ON
GROWTH AND AFLATOXIN PRODUCTION BY *ASPERGILLUS
FLAVUS* ISOLATED FROM STORED CORN**

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The effect of *Melissa officinalis* essential oil (EO) on *Aspergillus flavus* growth and aflatoxin production was investigated in stored corn and evaluated. *A. flavus* was isolated from stored corn and identified as an aflatoxigenic strain. Conical flasks of 250 mL each containing 100 g of corn were sterilized by autoclave (121C, 15 lbs/in² for 15 min) and artificially inoculated with *A. flavus* approximately 10⁶ cfu/mL (control sample). Other samples were inoculated in the same manner as the control, but with the addition of different values of Melissa EO (781.25, 1562.5, 3125, 6250, 12500, 25000 and 30000, 35000 µg/ml (ppm)). Melissa EO was fungistatic at all concentrations, fungicidal and antiaflatoxigenic at 12500, 25000, 30000 and 35000 µg/ml from 7 days storage up to the end of storage at 21 days. Minimum inhibitory concentration for *A. flavus* was found to be 12500 µg/ml, and also limited the aflatoxin production to be under the safety level of 5 ppb determined by the Food and Agricultural Organization and World Health Organization. Melissa EO could be used as fungicidal and antiaflatoxigenic agents for *A. flavus* in stored corn especially in granaries. Melissa EO is safe, acceptable and extends the storage period of corn [1-3].

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CLINICAL ACUTE TOXICITY INFORMATION OF *MENTHA LONGIFOLIA* ESSENTIAL OIL

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Mentha longifolia is grown commercially for production of oils and leaves. For centuries, this plant has widely been used traditionally as a folk remedy for treatment of human gastrointestinal complaints in Iran. The essential oil of the plant was extracted using hydrodistillation. In the present study a total of 12 constituents, representing 96.6% of the oil were identified by gas chromatography/mass spectrometry (GC/MS). The main compounds were 1,8-cineole (19.8%), pulegone (17.3%), caryophyllene oxide (14.8%) and isomenthone (12.4%) [1]. *M. longifolia* essential oil was evaluated for its acute toxicity (14 days) by the intraperitoneal administration route in rats.

Healthy rats weighing 200–220 g, of either sex, were obtained from Pasture Institute (Iran). All animals had free access to tap water and standard rodent diet. To acute intraperitoneal toxicity and behavioral activity the animals were divided randomly in six rats each groups. To determine median lethal dose (LD₅₀) and non-observed-adversed-effect level (NOAEL), the essential oil was administered intraperitoneally in seven different doses (single dosing), 1000, 600, 370, 225, 140, 100 and 10 mg/kg per body weight (bw). Control group was administered orally of Tween 80 (2%) dissolved in distilled water. Mortality rate and toxic symptoms been observed in all groups for 14 days. LD₅₀ was calculated based on Lorke's method [2]. Body and selected organs weight have also been measured. At the end of experimental period and or when the animals were died, necropsic evaluations were performed. Tissue samples of liver, kidney, brain were taken.

From the results, intraperitoneal acute LD₅₀ was estimated to be 470 mg/kg/bw. Some Dose-dependent toxic symptoms, such as convulsion, hypoactivity, ataxia, and lateral recumbency were seen immediately after the intraperitoneal injection, while others (deceased appetite and weight loss) were observed soon after, and were more pronounced at the higher doses were showed in this study. There were also no significantly changes of weekly body and organs (kidney and heart) weight. Gross necropsy and microscopic examination revealed any pathologic changes. The acute NOAEL was revealed at 140 mg/kg/bw. In conclusion, *Mentha longifolia* essential oil is safe at dose of 140 mg/kg/bw for acute intraperitoneal toxicity study. These primary data indicated that *M. longifolia* contain toxic components thus the popular therapeutic utilization of the plant in traditional medicine must be used cautiously.

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**STUDY OF PULEGONE TOXICITY AND SPASMOLITIC ACTIVITY
(CHOLINERGIC MECHANISM) IN RAT**

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Pulegone is a major constituent of several essential oils obtained from medicinal plants that used for flavoring foods and drinks. *Mentha longifolia* essential oil, which has been reported to contain 17.3% pulegone, has also been used as a fragrance agent and traditionally in folk remedies for treatment of gastrointestinal complaints [1]. Acute toxicity was evaluated with 10, 100, 1000, 1600, 2900 and 5000 mg/kg doses then LD₅₀ were calculated based on Lorke's method [2]. Mortality rate and toxic symptoms been observed in all groups for 14 days. Body and selected organs weight have also been measured. The effects of 25, 50, 75 and 100 mg/kg of pulegone on the gastrointestinal (GI) propulsion in rat were assessed *in vivo*. Adult Wistar rats of either sex weighting 180-200g were starved for 24 h prior to the experiment but were allowed free access to water. Pulegone was suspended in 2% Tween 80 and orally administered to rats (n = 6). Atropine (1 mg/kg, *p.o.*) was given to animals in the reference group while control animals received solvent at 10 mL/kg. In order to investigate cholinergic system interaction, another set of animals received pulegone (75 mg/kg) after being treated with atropine. Thirty minutes after drug administration, each animal was administered 2 mL of a charcoal meal (5% activated charcoal suspended in 10% aqueous tragacanth) orally. The animals were killed after 30 min, and the entire length of the small intestine, was removed carefully. The distance travelled by the charcoal plug in the intestine (A) and the total length of the intestine (B) was measured. The percent of intestinal transit was calculated for each animal as $(A/B) \times 100$ [3].

Dose-dependent toxic symptoms including convulsion, labored breathing, ataxia, hypoactivity, and lateral recumbency were showed in this study. The LD₅₀ was 400 mg/kg. Pulegone (25-100 mg/kg) resulted reduction as dose-dependent manner while inhibitory effect in GI propulsion in higher concentrations were significant (P<0.05). In comparison with atropine the higher doses demonstrate more effective and significant effect (P<0.05). Pulegone together with atropine showed a significant inhibitory effect. This finding indicates that pulegone may act by other mechanism(s) than cholinergic system. These primary data indicated that although pulegone (present in *M.longifoli* essential oil) exerts a remarkable spasmolitic effect, due to its potential toxicity it should be used cautiously.

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**EFFECTS OF ARTEMISIA DRACUNCULUS ESSENTIAL OIL ON THE
RAT INTESTINAL TRANSIENT: CHOLINERGIC SYSTEM
INTERACTION**

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Artemisia, one of the largest genera of Asteraceae family, is widely distributed in the northern hemisphere. *Artemisia dracunculus* (Tarragon) is known as “Tarkhun” in Iran. The essential oil of *A. dracunculus* (EOAD) was extracted using hydrodistillation. Sixteen compounds, representing 94.06% of the oil, were identified using gas Chromatography/ mass spectrometry analyses, Hinokitiol (17.47%), estragole (17.28%), pulegone (10.23) were the major compound in the oil [1]. LD₅₀ was calculated based on Lorke’s method [2]. The effects of 50, 75, 100 and 125 mg/kg of EOAD on the gastrointestinal (GI) propulsion in rat were assessed *in vivo*.

Adult Wistar rats of either sex weighting 180-200 g were starved for 24 h prior to the experiment but were allowed free access to water. EOAD (50–125 mg/kg) was suspended in 2% Tween 80 and orally administered to rats (n = 6). Atropine (1 mg/kg, *p.o.*) was given to animals in the reference group while control animals received 2% Tween 80 at 10 mL/kg. In order to investigate cholinergic system interaction, another set of animals received EOAD (100 mg/kg) after being treated with atropine. Thirty minutes after drug administration, each animal was administered 2 mL of a charcoal meal (5% activated charcoal suspended in 10% aqueous tragacanth) orally. The animals were killed after 30 min, and the entire length of the small intestine, was removed carefully and placed on a clean surface. The distance travelled by the charcoal plug in the intestine (A) and the total length of the intestine (B) was measured. The percent of intestinal transit was calculated for each animal as (A/B) × 100 [3].

The LD₅₀ was 707.10 mg/kg. The vehicle (1% Tween 80) did not show any effect. EOAD (50-75 mg/kg) resulted in a slight reduction as dose-dependent manner while higher concentrations (100-125 mg/kg) caused a significant inhibitory effect in GI propulsion (P<0.05). In comparison with atropine the higher doses demonstrate more effective inhibition (P<0.05). EOAD together with atropine showed a significant inhibitory effect. This finding indicates that EOAD may act by other mechanism(s) than cholinergic system. These primary data indicated that the plant oil contained spasmolytic constituents. In the other word, results obtained in this *in vivo* study tended to support the popular therapeutic use of *A. dracunculus* in traditional medicine or certain gastrointestinal disorders.

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**INVESTIGATION OF MEDICINAL PLANT CONSUMPTION IN
KHORRAM ABAD TOWNSHIP VIEWPOINT CUSTOMERS**

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To be informed form medicinal plants consumption and production in an area caused by better programming and arranging for support herbal grocery. This study was conducted investigation of medicinal plants consumption viewpoint herbal grocery. Data was collected in 2012 based on field and library studies by using questionnaire which involved descriptive and four-selecting. Samples were all of the medicinal plant consumers in Khorram Abad Township. Sixty customers were selected from different regional of the township as complete randomizing from different time of day, every morning to late afternoon. Reliability and stability analysis tested by using Cronbach's alpha and in this regard result was acceptable. Descriptive results show that medium age of consumers was 33.5 years. All of the consumers were educated. The most precedence of the consumers was more than 5 years as 47% samples. Also result show that 80% the person have enough information about properties of medicinal plants. About 60% of samples buy needed medicinal plant according to its information about medicinal plants properties and 40% don't have its buy based on useful information just buy based on some person opinion such as; friends, families and doctors. The most consumers were female with 55% abundance. About 65% samples use medicinal plants as traditional packing and 75% samples use native production. 85% samples have enough satisfaction of quality of native medicinal plants production. From 25% samples that use imported medicinal plant have not satisfaction that was 55%. Analytical analysis results show that there is direct relationship between precedence and years with consumption. The most consumption form was dry herb at 67% level of statistical namely borage, thyme and chamomile were the most and the lowest were mountain tea and spearmint, respectively. Also in spices plants, turmeric, chili paper and fennel were the most and the lowest were black paper and ginger respectively.

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EVALUATION OF DIFFERENT DRYING METHODS ON ESSENTIAL OIL AND CHAMAZOLENE CONTENTS OF CHAMOMILE FLOWERS

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Chamomile (*Matricaria chamomilla* L.) is one of the most important medicinal plants that it has been used as an herbal medicine for centuries. In order to determine the effects of drying methods on drying time and qualitative characteristics of chamomile flower, an experiment was conducted based on completely randomized design with six replications at the Special Laboratory, College of Agriculture, Ferdowsi University of Mashhad during 2012. Flowers dried at three temperature with oven (30, 40 and 60°C) and natural methods (shaded and sunny airs). The drying process was continued until the moisture content reduced about 10% based on dry weight. The results showed that the effects of different drying methods were significant ($p \leq 0.01$) on essential oil and Chamazolene contents of chamomile. The highest Chamazolene and essential oil were observed in shaded air (with 0.8 and 7.6%, respectively) and their lowest were in 60°C oven (with 0.2 and 3.3%, respectively).

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STUDY OF DIFFERENT DRYING METHODS ON QUALITATIVE CHARACTERISTICS OF THYME

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Thyme (*Thymus vulgaris* L.) is one of the most ancient medicinal plants that it has been medicinally used for thousands of years. In order to evaluate the effects of drying methods on drying time and qualitative characteristics of thyme, an experiment was conducted based on completely randomized design with six replications at the Special Laboratory, College of Agriculture, Ferdowsi University of Mashhad during 2012. Leaves dried at three temperature with oven (30, 40 and 60 °C) and natural methods (shaded and sunny airs). The drying process was continued until the moisture content reduced about 10% based on dry weight. The results indicated that effects of different drying methods were significant ($p \leq 0.01$) on essential oil and Thymol contents of thyme. The highest Thymol and essential oil were observed in shaded air (with 0.7 and 54.7%, respectively) and their lowest were in 60 °C oven (with 0.2 and 19.8%, respectively).

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**ANALYSIS OF SEED GERMINATION IN TWO MEDICINAL SPECIES
OF SALVIA UNDER DIFFERENT CHEMICAL TREATMENTS**

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Because of the importance of medicinal plants in treatment of many diseases and in their natural habitat limitations, low reproducibility and their uncontrolled harvest from nature, the regeneration of these plants is greatly necessary. In this experiment in order to determine the effects of different treatments on seed germination in two medicinal salvia species (*Salvia spinosa* and *Salvia viridis*), the plants were collected from their natural habitat in Zanjan province and 6 pre growth treatment were applied as follows: Gibberelic acid (GA) at 10 and 100 mg/l concentrations, kinetin at 10 and 100 mg/l concentrations, 25% sodium hypochlorite and distilled water as control. This experiment was carried out in completely random design with three treatments. The comparison of mean values showed that among treatments, GA at 100 mg/l showed the maximum influence on seed germination of both species which accelerate the percentage and speed of germination in both species. In *S. spinosa* the highest rate of seed germination (93.32%) was observed at light after 2 days and it was 32.21% at dark condition with GA at 100 mg/l treatment. The least germination rate in this species which was 11.10 at light and 0 at dark was observed at control (distilled water). In *S. viridis* the highest percent of seed germination (53.23%) was observed at light after 2 days with GA at 100 mg/l treatment. The least germination rate in this species which was 0 at dark was observed at distilled water. Additionally in this species the maximum rate of germination at dark conditions (16.6%) was observed at GA at 100 mg/l and the minimum rate was 0 at control. It can be concluded that GA at 100 mg/l concentration is the best chemical treatment to promote the seed germination in these two salvia species.



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**POWDER AND ESSENTIAL OIL OF MEDICINAL HERB OF
TURMERIC FOR BROILER UNDER HEAT STRESS: EFFECT OF
PERFORMANCE AND CARCASS CHARACTERISTICS**

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The present research aimed to evaluate the effect of different levels of turmeric (*Curcuma Longa*) rhizome powder (TMP) and its associated essential oil (TMO) on performance and carcass characteristics in broiler chicks under heat stress ($32\pm 2^{\circ}\text{C}$ for 8 hours). A total of 336 day old male broiler chicks (Cobb-500) with 6 treatments and 4 replications (14 birds per replicate) were used. Experimental diets were a corn-soybean based diet with no supplement (control), diet containing 100 ppm vitamin E as positive control, diets containing 7.5 and 15 g/kg of TMP, diets containing 75 and 150 ppm of TMO. The result showed that body weight and body weight gain did not significant different among dietary groups. In orthogonal comparisons, inclusion TMO in the diet increased body weight (BW) on day 10, and body weight gain in day 1-10, when compared with positive control group. There were no significant different between experimental groups regarding as compared to control birds. In linear contrasts between TMO vs control diets, inclusion TMO in the diet decreased food intake during 1 to 10 days of age. Food conversion ratio (FCR) on 1 to 10 days of age was significantly ($P<0.05$) decreased in birds received 75 ppm TMO as compared to control birds and 150 ppm TMO as compared to 7.5 g/kg TMP groups. In orthogonal comparison, TMO groups decreased FCR during 1 to 10 days of age, when compared with control and positive groups. Also, including TMP in diet decreased FCR when compared with TMO groups. During 11 to 22 days of age, including TMP in diet increased FCR when compared with control treatment, and in 43 to 49 days of age, addition TMP and TMO in diet decreased FCR when compared with control group. There were no significant difference between dietary groups regarding relative weights of carcass, liver, pancreas, empty small intestine, spleen, bursa fabricius, heart, empty gizzard, abdominal fat at 35 and 44 days of age.

These results suggest that powder and essential oil of turmeric supplementation was favorable for the performance of broiler chickens by alleviating the adverse effects of heat stress, and it could be used as growth promoters and also as a replacement for antibiotics and synthetic antioxidant in broiler diets under heat stress condition.

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**THE EFFECTS OF DROUGHT STRESS AND MICRONUTRIENTS
SPRAYING ON GROWTH, YIELD AND YIELD COMPONENTS OF
BLACK CUMIN (*NIGELLA SATIVA* L.)**

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In order to survey the effects of Irrigation and spraying of micronutrients on vegetative growth, yield and yield components of black cumin (*Nigella sativa* L.), an experimental design was conducted in research farm of North khorasan agricultural and natural resources research center in Bojnourd in 2009. Experimental design was a split plot based on randomized complete block design with three replications. The main factors were irrigation intervals in three levels ($I_1=7$, $I_2=14$, $I_3=21$ days) and the sub factors were spraying micronutrients included M_1 = control (no spray), M_2 = spraying with the Zinc (concentration of three parts per thousand), M_3 = spraying with the Boron (concentration of two parts per thousand), M_4 = spraying with the Iron (concentration of four parts per thousand) and M_5 = spraying with the mixture of above elements. Experiment results showed that the impact of irrigation intervals on plant height, branch number, number of capsules per plant, biological yield seed number per plant, seeds per capsule, seed weight, harvest index percentage, seed yield, was significant and decreased with increasing irrigation intervals. The effects of spraying of micronutrients on plant height, branch number, number of capsules per plant, biological yield, seed number per plant, seeds per capsule, seed weight, seed yield, harvest index, and Fe, Zn, and Br concentration in plant organs was significant. Spraying of micronutrients caused plant height, branch number, number of capsules per plant, biological yield and Fe, Zn, and Br concentration in plant increased. Spraying of micronutrient and irrigation interaction on plant height and biological yield were significant. Seven days irrigation intervals and spraying the mixture of micronutrients treatment caused the highest plant height, biological yield and Fe, Zn, and Br concentration in plant organs.

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**THE SURVEY ON EFFECTS OF IRRIGATION AND WEED CONTROL
ON YIELD, YIELD COMPONENT AND SEED OIL CONTENTS OF
MARIGOLD (*CALENDULA OFFICINALIS* L.)**

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This experiment was conducted to investigate the effects of irrigation and weed control on yield, yield components and seed oil content of Marigold in the research farm of Ferdowsi University of Mashhad in 2006. Experimental design was split plots in a randomized complete block design with three replications. The main factor included four levels of irrigation based on 45, 75, 105 and 135 mm of pan evaporation and subplots were weed control included without weed control, hand weeding once and twice during the growing season. Statistical analysis of the data showed effects of irrigation and weeding on seed yield, yield components and oil content of Marigold seeds was significant. The highest seed yield was obtained by irrigation treatments 45 mm of pan evaporation and weeding twice ($2025/42 \text{ kg.ha}^{-1}$). The lowest seed yield obtained by irrigation treatments 135 mm of pan evaporation and no weeding ($901/08 \text{ kg.ha}^{-1}$), which was significantly different from other treatments. Most seed oil content (22/91 percent) was obtained from irrigation treatment based on 135 mm evaporation pan that was statistically significant difference than other treatments. Irrigation treatments based on 135 mm of pan evaporation caused minimum yield and oil yield per hectare, seed number per head and thousand seeds weight.

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**THE SURVEY ON EFFECTS OF NITROGEN FERTILIZER
APPLICATION AND DENSITY ON SEED YIELD, YIELD
COMPONENTS AND OIL CONTENT OF MARIGOLD
(*CALENDULA OFFICINALIS* L.)**

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This experiment was conducted to investigate the effects of nitrogen fertilizer and plant density on yield, yield components and seed oil content of Marigold during the year 2006 in the field of Ferdowsi University of Mashhad. Experiment was conducted by split plots in a randomized complete block design with three replications. The main factor was nitrogen fertilizer application containing four levels included zero (control), 40, 80 and 120 kg N / ha. Subplots were density (plant per square meter), included 20, 40, 60 and 80 plants per square meter. Statistical analysis of data showed the effects of nitrogen fertilizer application and density on seed yield, yield components and oil content of Marigold seeds was significant. The highest seed yield (1894/25 kg.ha⁻¹) obtained by 80 kg per hectare of nitrogen and plant density of 60 plants per square meter. The lowest seed yield (1232/51 kg.ha⁻¹) obtained by 20 plants per square meter density without the use of nitrogen fertilizer (control), which was significantly different from other treatments. Interactive effects of nitrogen fertilizer and plant density showed the highest, oil content, oil yield, seed number per plate and 1000seed weight, were, 19/45 percent, 345/17 kg.ha⁻¹, 28/17 numbers and 12/75 g. respectively that obtained by application of 80 kg N. ha⁻¹ and density of 60 plants .m⁻² treatment. The positive effect of nitrogen fertilizer on seed yield and reproductive parameters of Marigold were more evident.

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EVALUATION OF ANTIRADICAL ACTIVITY AND ANTIOXIDANT CAPACITY OF METHANOLIC EXTRACT OF GORG TIGH PLANT (*LYCIUM RUTHENICUM* MURRY)

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Radical scavenging activity is considered to be involved in aging processes, anti-inflammatory, anticancer and wound healing activity. The development of antioxidants that scavenge reactive oxygen species (ROS) would support biological resistance to free radicals, retard the process of aging and decrease the risk of age-associated degenerative diseases [1]. However, it has been demonstrated that synthetic antioxidants can accumulate in the body which can result in liver damage and carcinogenesis. These problems are not seen when natural antioxidants, extracted from herbs and spices with high antioxidant activity, are used in food applications.

1,1-Diphenyl-2-picrylhydrazyl (DPPH), is a kind of stable organic radical. The DPPH oxidative assay adopted in the study is used worldwide in the quantification of radical scavenging capacity (RSC). The capacity of biological reagents to scavenge the DPPH radicals, can be expressed as its magnitude of antioxidation ability. The DPPH alcohol solution is deep purple in colour with an absorption peak at 517 nm, which disappears with the presence of the radical scavenger in the reactive system when the odd electron of the nitrogen in the DPPH is paired. The reactive rate and the ability of the radical scavenger depend on the rate and the peak value of disappearance of the DPPH [2]. *Lycium ruthenicum* Murry a member of Solanaceae family is a unique nutritional food, which widely distributes in desert of Birjand, Iran. In this study, we investigated the antioxidant capacity of the *Lycium ruthenicum* Murry against DPPH [3]. The results showed that seed extract had the highest total antioxidant capacity (IC₅₀=16/816 mg/ml).

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**DETERMINATION OF TOTAL PHENOLIC, TANNIN AND
FLAVONOID CONTENT IN *LYCIUM RUTHENICUM* MURRY**

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Polyphenols are widely distributed throughout the plant kingdom and represent an abundant antioxidant component of the human diet. These compounds are generally classified into flavonoids, phenolic acids and tannins. During the past decade, interest in the possible health benefits of polyphenols has increased due to their antioxidant capacity and many polyphenols, particularly the flavonoids, have been found to possess relatively potent antioxidant, antiatherosclerotic, anti-inflammatory, antitumoral, antithrombogenic, antiosteoporotic, and antiviral activities [1,2]. *Lycium ruthenicum* Murry with native name "Gorg tigh" a member of Solanaceae family is a plant of central sandy areas of Iran. In this study, we have determined Phenolic compounds, Flavonoids and Tannin in five different extracts (Et₂O, CHCl₃, EtOAc, *n*-BuOH, and H₂O). The highest amount of Phenolic compounds and tannin were found in BuOH extract of seed (1.86 mg/g and 6.345 mg/g, respectively). The Et₂O extract of seed has also been observed the highest amount of Flavonoids (0.25 mg/g). The smallest quantity of Phenolic compounds and tannin were found in the CHCl₃ extract of seed and the lowest amount of Flavonoids was found in CHCl₃ extract of root.

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**ANTICONVULSIVE EFFECTS OF VITEXIN, A FLAVONOID, ON
PENTYLENETETRAZOLE-INDUCED SEIZURE IN RATS**

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Nowadays many researchers try to evaluate neuroactive function of natural flavonoids in the central nervous system (CNS). One of these flavonoids is vitexin (5, 7, 4-trihydroxyflavone-8-glucoside) that is an important dietary constituent of food and plant-based beverages. Vitexin is a c-glycosylated flavone found in a number of plants such as *Passiflora* sp., bamboo leaves, pigeon pea leaves and mung bean. It has several pharmacological properties, including antinociceptive, antispasmodic, antioxidant, antimyeloperoxidase, and α -glucosidase inhibitory activities [1-4]. However, the neuroprotective effect of vitexin on epilepsy is unclear. A selective block of the chloride channel coupled to the GABA_A receptor complex is considered to be related to neuropathology of epilepsy. This study aimed to investigate the anticonvulsant effects of intracerebroventricularly administered vitexin in rats treated with pentylenetetrazole (90 mg/kg, intraperitoneally) and to clarify the underlying mechanism. Vitexin (100 and 200 M, i.c.v) affected minimal clonic seizures and generalized tonic-clonic seizures induced by pentylenetetrazole by increasing the seizure onset time. Pretreatment with flumazenil suppressed the anticonvulsant effects of vitexin during the onset of both the seizures. These results indicate that vitexin has anticonvulsant effects in the brain, possibly through interaction at the benzodiazepine site of the γ -aminobutyric acid type A receptor complex.

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**CORRELATION AND PATH COEFFICIENT ANALYSIS OF SEED
YIELD AND YIELD COMPONENTS OF FLAX**

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Flax seed offers important nutritional benefits because of the high levels of omega-3 fatty acids, alpha-linolenic acid (ALA); fibre; and lignans that can be used for industrial, medicine, feed and food products including a wide variety of nutraceuticals and health foods. This study was conducted to determine association between yield and some related traits and to determine their direct and indirect relationships using six linseed genotypes under two different levels of irrigation. The results showed that the highest amount of seed yield, number of capsules per plant and number of seeds per capsule occurred for KO37 genotype under water stress condition. According to most of the traits, KH124 genotype was recognized as a tolerant genotype under water stress condition. Seed yield per plant had a significant and positive correlation with number of capsules per plant and number of seeds per capsule under water stress condition, and with number of capsules per plant and 1000 seeds weight under non stress condition. Path analysis identified number of capsules per plant as important component having direct effects on seed yield per plant. We concluded that, number of capsules per plant, number of seeds per capsule and 1000 seeds weight traits should be an integral part of effective selection criteria leading to yield enhancement in linseed.

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**EFFECT OF NO ON FE DEFICIENCY-INDUCED CHLOROSIS IN
*MELISSA OFFICINALIS***

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Fe is a component of many proteins required for crucial cellular processes and is involved in numerous vital functions, including respiration, photosynthesis and cell division [1,2]. In calcareous soils, iron availability to plants is subjected to the effects of bicarbonate ions. In order to study the influence of NO on Fe deficiency-induced chlorosis of *Melissa officinalis*, plants were grown in at variable iron and SNP (a donor NO) concentrations in nutrient solution. Exposure of balm plants to Fe stress showed retarded growth, decreased chlorophyll content and biomass. SNP caused re-greening of leaves in Fe-deficient balm plants and increased *in vivo* NO content, raised chlorophyll concentrations, promoted growth and dry weight. Nitric oxide (NO) has alleviated Fe-deficiency effects, possibly by improving the functionality of the small amounts of Fe present in Fe-deficient leaves.

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**EFFECT OF VALERIAN OFFICINALIS ON FSH AND ESTROGEN IN
FEMALE MATURE RATS**

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Lots of people tend to use safe traditional plants in Iran. Medicinal properties of valerian have long been known and used in traditional medicine in Iran (1). In this study, effect of Valerian officinalis on FSH and Estrogen in female mature rat was studied. In this study 40 adult female rats of Wistar weighing approximately were prepared and after environmental accommodation and synchronization they were divided into 5 groups of 7, including a control (notreatment), blank (receiving saline) and experimental groups 1, 2 and 3. *Valeriana officinalis* extract in doses of 200, 400, 800 mg/kg body weight were injected in the intraperitoneal space of experimental rats 1, 2 and 3 daily for 3 weeks. At the end of the treatment period, blood and serum of rats were studied biochemically. Data were analyzed by using SPSS version 17, ANOVA and Duncan's test at a significant level of $p \leq 0.05$. The findings showed that FSH in all experimental groups had increased significantly. Estrogen showed a significant decrease in all group compared with control group ($p \leq 0.05$). Component of valerian extract tannins that were introduced with other materials based on performance and function of the hypothalamic - pituitary -gonadal and ovary tissue negative effect but that its mechanism is not clear (2). As stated iridoid also found in some plants and production of ROS (*Reactive oxygen species*) inhibition activity and steroidogenesis (3). This study suggests that valerian may have an adverse effect on FSH and estrogen secretion. Therefore it should be used carefully especially in pregnancy.

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IDENTIFICATION OF THE COMPONENTS OF SAGE (*SALVIA OFFICINALIS* L.) AND THYME (*THYMUS VULGARIS* L.) CULTIVATED IN ISFAHAN CLIMATIC CONDITIONS

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Sage (*Salvia officinalis* L.) and thyme (*Thymus vulgaris* L.) are perennial shrub and aromatic plants belongs to Lamiaceae family, native to Mediterranean Basin [1]. Thyme and sage contain are mixture of monoterpenes. Thyme exhibits multiple biological activities including anti-inflammatory, immunomodulating, antioxidant, antibacterial, antifungal, and free radical scavenging properties. Sage similar to thyme, evinces exhibit antioxidant, anti-inflammatory, antispasmodic, antimicrobial, stimulant, and used for wound treatment, bathing, washing, skin and hair care properties. The aim of this study was to identification of the components of Sage and thyme cultivated in Isfahan climatic conditions. The aerial parts of plants were collected in Isfahan (Meymeh) Province in 2011. The aerial parts of plants analyzed by using GC/MS in Islamic Azad University Khorasgan (Isfahan). The 19 and 31 compounds were identified in dried aerial parts thyme and Sage, respectively. The results obtained in our study showed that major components thyme were; γ -Terpinene (42.35%), thymol (14.18%), α -Thujene (10.74%), linalool (5.42%), Caryophyllene (2.942%), borneol (2.48%) and Carvacrol (1.07%). The major components sage were; Camphor (17.75%), Thujone (13.25%), 1,8-Cineole (13.03%), α -pinene (6%), β -Thujone (5.85%), α -Humulene (5.48%), β -Caryophyllene (5.07%) and borneol (3.72%). Variation in constitution can be due to both environmental and genetic factors.

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**EXTRACTION AND IDENTIFICATION OF THE COMPONENTS OF
TWO ECOTYPES OF (*MENTHA LONGIFOLIA* L.) IN IRAN PROVINCE**

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Lamiaceae is subdivided in to two major groupings: The Lamioideae and Nepetoideae. (*Mentha Longifolia* L.) is one of the members of the subfamily Nepetoideae. The genus *Mentha* includes 25 to 30 species that grow in the temperate regions of Eurasia, Australia and South Africa [1]. Grows as wild in various regions of Iran. *M. longifolia* (L.) is used in Iranian traditional medicine as a stomach pain-relieving agent, antispasmodic, digestive and carminative [2]. The aerial parts of (*Mentha Longifolia* L.) were collected from the in two Iran province, ecotypes 1 (Karkas mountain, Isfahan province) and ecotypes 2 (Gahar, Lorstan province) in 2012. The aerial parts of plant analyzed and identified by using GC/MS in Islamic Azad University Khorasgan (Isfahan). The aim of the present work is to extraction and identification of the components of (*Mentha Longifolia* L.) in two Iran provinces. The 37 and 33 compounds were identified in dried aerial parts Isfahan and Lorstan province, respectively. The major components in Isfahan province were; 1,8-Cineole (15.58%), Piperitenone oxide (15.05%), Pulegone (9.58%), Sabinen (9.52%), 2,6-Dimethyl-2,4,6-oc tatriene (6.768%), α -Pinene (5.519%), β -Caryophyllene (4.636%) and β -Pinene (3.568%). The major components in Lorstan province were; p-Mentha-3,8-diene (10.531%), 2,6-dimethyl-2,4,6-oc tatriene (10.132%), Sabinene (6.98%), β -Caryophyllene (6.971%), Piperitone oxide (6.77%), Pulegone (6.60%), Pulespenone (6.462%), Menthofuran (6.42%), α -Terpinolene (5.848%), α -Pinene (5.46%), 1,8-Cineole (5.272%) and Isopulegone (4.4%). In general, Isfahan province contained the highest 1,8-Cineole, Piperitenone oxide and Pulegone in comparison with Lorstan province.

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INVESTIGATION OF ANTIOXIDANT ENZYMES ACTIVITIES, SOIL TEXTURE, AND STIGMA-LIKE STRUCTURES IN PETALS CULTURE OF SAFFRON (*CROCUS SATIVUS* L.)

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Saffron (*Crocus sativus* L.) is a valuable medicinal plant whose product is varied under different types of stresses. Stress factors often induce oxidative stress in plant cells, generally leading to the synthesis of signal molecules that activate a range of signal transduction pathways. One of the signal molecules produced under stress is H₂O₂. The production of ROS has been associated with plant recalcitrance during in vitro culture. catalase (CAT) and peroxidase (POX) are known to play a role in growth and differentiation and their high activity could be correlated to the process of differentiation. An experiment was designed to study the relation between stress from soil clay content, field capacity (FC), intensity of CAT and POX activities, the enzyme that participate in many physiological aspects and its expression pattern is organ-specific and developmentally regulated, and the amount stigma-like structures (SLS) obtained from tissue culture of immature petal. Immature floral buds and corms were collected from Karaj and Shahrood regions. The petals were separated, disinfected and cultured in MS medium supplemented by 10 mg/L BAP and NAA to obtain SLS. CAT and POX intensity of calluses in Acrylamid gel was examined and field capacity and soil texture were determined in both of the above regions. Soil from Karaj indicated 50% clay content, field capacity of 4.33 and 57% SLS product, while those of shahrood were 75%, 6.116 and 27%, respectively. CAT intensity in Karaj samples with more SLS was less than shahrood whereas POX intensity in Karaj samples was more than shahrood. Results showed that amount of SLS product was inversely related with soil clay content and field capacity, so peroxidases will be more important in cleavaging of H₂O₂ than catalase did.

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**PHYLOGENETIC ANALYSIS OF THE TRIBE FABEAEE BASED ON
PLASTID DNA SEQUENCES**

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Lathyrus is the largest genus in tribe Fabaeae comprising 23 species in Iran. In this study 54 accessions representing 30 species of *Lathyrus*, 3 species of *Pisum* plus 2 species of *Lens* and 4 species of *Vicia* as in groups were included in a phylogenetic analysis using *matK* and *trnT-Y* sequences. Two species of *Melilotus* and one species of *Trifolium* were chosen as outgroups according to previous studies [1,2]. Maximum Parsimony (MP) method as implemented in PAUP* 4.0b10, Bayesian method using MrBayes 3.12 and Maximum Likelihood method using PhyML were used to construct phylogenetic trees. Similar to individual dataset, the analyses of the combined dataset indicated that Fabaeae forms a well-supported monophyletic group. The result of molecular analyses revealed that *Lens* and *Pisum* are monophyletic. Monophyly of *Lathyrus* confirmed with Shimodaira-Hasegawa test. *Pisum* clade is, in turn, sister to *Lathyrus*. *Vicia* is paraphyletic with *Lens*, *Pisum* and *Lathyrus*. In our combined trees, several sections of *Lathyrus* including *Notolathyrus*, *Lathyrostylis*, *Clymenum*, *Lathyrus* and *Pratensis*, are monophyletic. But sections, *Linearicarpus* and *Orobus* are not monophyletic. The newly described species *L. alamutensis*, native to Iran, were nested among other species of *Lathyrostylis*.

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**EFFECT OF UV-C RADIATION ON SOME PHYSICO CHEMICAL ON
POMEGRANATE IN WAREHOUSE (*PUNICA GRANATUM L.*)**

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Anthocyanins and other phenolic compounds of Pomegranate juice have preventive and therapeutic effects on cardiovascular disease, inflammation and different cancer types [1]. The primary objectives of our study were to subject pomegranate juice to UV-C irradiation and determine the changes in anthocyanin contents and some physicochemical characteristics of Pomegranate juice. In this experiment fruits were treated with dose of radiation of 0, 0.5 and 0.75 Kjm⁻². These fruits were kept in 7 degrees centigrade for 50 days. The results were compared with control (untreated). UV-C treatment preserved the major quality characteristics of pomegranate juice better than untreated. After UV- C treatment, antioxidant capacity of pomegranate juice did not change significantly. And decrease in individual anthocyanin pigments did not change significantly. There were no significant changes in antioxidant capacity of Pomegranate juice after UV-C. The effectiveness of the UV-C system on the mould respectively.

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**PREPARATION OF NANONIOSOMAL PACLITAXEL FORMULATION
AND EVALUATION ITS EFFECTS ON THE BREAST CANCER CELL
LINE (MCF-7)**

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Cancer is known as a universal disease worldwide. Breast cancer is the most common cancer among women [2]. One million cases of breast cancer are diagnosed worldwide [3]. Treatment may include surgery, radiotherapy and chemotherapy [4]. Paclitaxel as a member of taxols, is an anticancer agent effective for the treatment of breast cancer. *Taxus baccata* as a name of a softwood tree that classified in the Taxaceae family is the source of paclitaxel. *Taxus baccata* is vegetated in Europe, North Africa and several of jangles in north of Iran including Astara to Gorgan. Nanotechnology based drug-delivery equipment are used to reduce the adverse effects and also increase the therapeutic index of drugs such as paclitaxel [1]. Of injected carriers in nanoscale cross biological barriers, protection and release of the drug may be used to optimize dose. Noisome is a nano carrier used for drug delivery applications. In this study we have succeeded to produce the pegylated form of paclitaxel loaded nanonoisome using ether injection method. During this method we have mixed the span 20, cholesterol and paclitaxel compounds at defined ratio and to increase the stability, efficacy, and also solubility Poly Ethylene Glycol (PEG2000) is contributed to obtain the pegylated form of nanocarrier. The hydrodynamic diameters of pegylated and unpegylated drug loaded nanonoisomes were measured using Zeta sizer instrument and recognized to be 373/1 and 481/2 nm respectively. Drug entrapment efficiency of pegylated and unpegylated form of paclitaxel-loaded nanonoisomes were estimated 90/5 and 94/3 percent respectively. Drug release rates over 48 hours were performed for pegylated and unpegylated formulations using dialysis bag method. This study also shown that pegylation achievement exerted considerable effect on the cell cytotoxicity profiles of formulation at in vitro in that pegylated form compare to unpegylated applied more cell cytotoxicity.

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HEAVY METAL ACCUMULATION IN MEDICINAL PLANTS
CHENOPODIUM ALBUM COLLECTED FROM ENVIRONMENTALLY
DIFFERENT SITES

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To estimate the heavy metal content in soil and selected medicinal plants procured from environmentally different sites of the same city. Methods Soil and plant samples of, *Chenopodium album* were collected from 3 environmentally different sites of the city heavy traffic area (HTA), industrial area (IA), and residential area (RA). Pb, Cd, Cr, and Ni were estimated in soil and plant samples by Atomic absorption and compared. Results the level of heavy metal was higher in soil than in plant parts studied. Accumulation of heavy metals varied. Pb was the highest in root from HTA site and the lowest in whole plant from IA site. It was also lower in residential area than in heavy traffic area. Conclusion the level of heavy metal content differed in the same medicinal plant collected from environmentally different sites of the same city. Thus, it reiterates our belief that every medicinal plant sample should be tested for contaminant load before processing it further for medication. [1]

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**AERIAL PARTS FLAVONOIDS OF *ELEOCHARIS UNIGLUMIS* (LINK)
SCHULT. (CYPERACEAE)**

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Eleocharis R. Br. from *Cyperoideae* (Cyperaceae) has about 250 species in the world [1] and 4 species in Iran [2]. Many flavonoids are active principles of medicinal plants, exhibit pharmacological effects and contribute to human health. Today, flavonoids are used for making antitumour, anticancer, antibacterial, antiviral, antifungal drugs and insecticides [3]. Also flavonoids are valuable and widely and effectively used in chemosystematics [4]. *Eleocharis uniglumis* is one species of *Eleocharis* that commonly found in the river and lagoons of eastern north to eastern south of Iran [5, 6]. Wei et. al (2009) found flavonoids compounds in *E. tuberosa* by Microwave Extraction Techniques [7]. Antioxidant activity of *E. toberosa* determined using Folin-Ciocaltea method and the method was convenient, fast, accurate and reliable for the determination of total polyphenols in the species [8]. In this study, aerial parts flavonoids of *E. uniglumis* are reported. Aqueous-ethanolic extract of collected plant material was examined to practice flavonoid detection, isolation and identification by 2-Dimensional Paper and Thin Layer Chromatography and available references. Results showed aerial part of the species contain flavonoid sulphates, flavones C and C-/O glycosides and aglycones. Vitexin, quercetin, Apigenin, naringenin and chrysin were found in the species leaf and inflorescence.

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ROOT FLAVONOIDS OF *CYPERUS* L. (CYPERACEAE) SPECIES IN
MARKAZI PROVINCE, IRAN

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Cyperus L. from *Cypereae* (*Cyperoideae*, Cyperaceae) has about 600 species in the world [1] and 16 species in Iran [2, 3]. Flavonoids are valuable and widely and effectively used in chemosystematics [4]. Some flavonoid compounds have been reported from the *Cyperus* genus [5, 6]. Today, flavonoids are used for making antitumour, anticancer, antibacterial, antiviral, antifungal drugs and insecticides [7]. Phytochemical studies on 5 *Cyperus* species leaves and 5 *Scirpus* species roots showed all of them contain flavonoids. Luteolin was found in all of *Cyperus* species with the exception of *C. fuscus* and rutin was found in three *Cyperus* species. Rutin, myricetin and vitexin were found in *S. Maritimus* [8, 9]. Phytochemical studies on 5 *Cyperus* species root (*C. esculentus*, *C. fuscus*, *C. iria*, *C. longus* and *C. rotundus*) from different parts of Markazi Province, Iran area were done using two-dimensional paper chromatography (2-DPC) and thin layer chromatography (TLC). Results showed all of roots contain flavonoid sulphates, flavones *C* and *C/O* glycosides and aglycones. *C. esculentus* species had the most flavonoids in its root. Myricetin was found in all of studied *Cyperus* root but Luteolin was just found in *C. iria*.

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**ANTIBACTERIAL ACTIVITIES OF *EUPHORBIA SPLENDIDA*
MOBAYEN (EUPHORBIACEA)**

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Euphorbia has more than 2000 species in the world and about 100 species in Iran [1, 2]. It contains flavonoids [3], terpenes [4], tannins, saponins and alkaloids [5]. These compounds could be active principles of medicinal plants and exhibit pharmacological effects [6]. *Euphorbia splendida* contains terpenes [4] and flavonoids [3]. *E. hirta* extract showed non cytotoxic and antibacterial effects [7]. Antibacterial activities of leaf crude methanolic and flavonoid extracts were investigated in this study. Plant material was extracted with methanol (by maceration) and ethanol (using 2-DPC and TLC methods). *In vitro* antibacterial activities of the extracts were examined against *Staphylococcus aureus* and *Escherichia coli* by paper disc method described by Dülger (2005) [8]. Then inhibition zones were calculated and compared with penicillin (10µg/disk). Crude methanolic extract showed stronger antibacterial activity against *S. aureus* than *E. coli*. But flavonoid extract was not effective on both examined bacteria. This study showed *E. splendida* could be suitable as antimicrobial agents in infectious disease treatment and the food industry and also more studies are needed in this connection.

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**CHEMICAL CONSTITUENTS OF *ARTEMISIA KOPETDAGHENSIS*
KRASCH**

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The genus *Artemisia* is one of the largest and widely distributed genera of the family Asteraceae. Thirty-four species of this genus are found in Iran, among which two are endemic: *A. melanolepis* Boiss. and *A. kermanensis* Podl. [1]. Several *Artemisia* species have medicinal importance and are useful in traditional medicine for the treatment of the variety of diseases and complaints [2, 3]. Extraction of aerial parts of *Artemisia kopetdaghensis* Krasch and chromatographic separation yielded a cyclic peroxide sesquiterpene (2, 6, 10-Trimethyl- 2, 5-epidioxy-7, 10-epoxydodeca-3,11-dien-5-acetoxy), a eudesmanolide type sesquiterpene lactones, eupatilin and 6-Demethoxy-4'-O-methylcapillarisin. The structures were elucidated by 1D and 2D NMR techniques.

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ANTIMICROBIAL ACTIVITY AND ESSENTIAL OIL COMPOSITION
OF *THYMUS TRANSCAUCASICUS* RONNIGER

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The genus *Thymus* L., known as “Avishan” in Persian, is a well known aromatic perennial herb originated from Mediterranean region. Among 215 species of this genus grown in the world, 14 species are distributed in Iranian flora [1]. *Thymus* species are well known as medicinal plants because of their biological and pharmacological properties. In traditional medicine, leaves and flowering parts of *thymus* species are widely used as tonic and herbal tea, antispasmodic, antitussive and carminative as well as treating colds [2,3]. The composition and antimicrobial activity of the essential oil *Thymus transcaucasicus* Ronniger, an endemic species from Iran, was studied. The volatile oil obtained by hydrodistillation as characterized by the physico-chemical properties, gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS) techniques. Thirty-seven compounds, accounting for 98.5% of total oil, were identified. The main constituents were thymol (60.61%) and p-cymene (9.32%), carvacrol (4.61%) and 1, 8-cineole (3.08%). The antimicrobial activity of essential oil of *T. transcaucasicus* was tested against seven Gram-negative and Gram-positive bacteria and three fungi by disk diffusion method. The results of the bioassay showed the interesting antimicrobial activity, in which the Gram-positive bacteria, *Bacillus cereus* and *Staphylococcus aureus*, were the most sensitive to the oil. Also, the oil exhibited a remarkable antifungal activity against all the tested fungi. These results confirm the possibility of using *T. transcaucasicus* in food system, medicine and pharmacy.

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**CHEMICAL COMPOSITION AND ANTIBACTERIAL ACTIVITY OF
ESSENTIAL OIL OF *NEPETA ASTEROTRICHA* RECH. F. FROM IRAN**

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Nepeta L. (Lamiaceae) contains about 300 species, which are distributed in central and southern Europe, the near east, and central and southern Asia. Iran is one of the centers of origin of the genus with 75 species and approximately 53% endemics [1]. Many *Nepeta* species have been reported to be biologically active and are widely used in folk medicine because of their antispasmodic, antiseptic, antiasthmatic, expectorant, and febrifuge activities [2, 3]. This research reports GC/MS analysis of the essential oil from the flowering aerial parts of *N. asterotricha*. The plant aerial parts were collected from Yazd, Province of Yazd, south-east Iran, in June 2012 during the flowering stage. Air-dried and ground herbal parts of the plant were subjected to hydrodistillation using a Clevenger apparatus and the yellow-colored essential oil was obtained in the yields of 0.9% (w/w). The essential oil was analyzed by GC/MS system and thirty compounds were identified. The major compounds were 1,8-cineole (26/12%), 4-terpinenol (14/83%), 4 α ,7 α ,7 α -nepetalactone (8/65%), cis-sabinene hydrate (8/58%), linalool (8/37%), and γ -terpinene (7/29%). The antibacterial activity of the isolated essential oil of the plant, in the three stages, was also investigated against seven Gram-positive and Gram-negative bacteria. The antibacterial activity was determined by using disk diffusion method. The growth inhibitory zone (mm) was also measured. The results of inhibition zone showed that this oil was active against some of the tested strain.

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THE STUDY OF THE ESSENTIAL OIL CONSTITUENTS OF VARIOUS SPECIES OF THE MINT FLOWER IN THE FLOWERING AND AFTER FLOWERING STAGES

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Mint as a medicinal plant with a strong smell has an old record in traditional medical in various countries and at the present has a vast usage in food, healthy and medical industries. Among of its volatile oil constituents, menthol and dementholized oil include the main share of the world trading of mint. For investigation of the chemical components of the flowers volatile oil of two imported species (*M. arvensis* and *M. piperita*) and two local species (from Ege and Eskişehir area in Turkey) of mint on the “Flowering” and “After Flowering” stages an experiment was performed in the experiment field of the Agriculture Faculty of Çukurova University in split plot design based on randomized complete block with four replications in 2011. In this experiment the various species of the mint were considered as the main factors and the various growth stages as the sub-factors. After extracting the plants dried leaves volatile oil by Clevenger apparatus, the volatile oil components were analyzed by using the GC and GS-MS. According to these experiment results, where as the rate of the menthol existing in essential oil of the *M. arvensis* flower was more than the other species, the rate of the menthon of the local mint from Ege was higher than the other plants. Also, the amount of the menthol and menthon during the Flowering stage were more than After Flowering stage.

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**CADMIUM INCREASE GLYCYRRHIZIC ACID CONTENT IN
GLYCYRRHIZA GLABRA VAR. GLANDULIFERA CALLI**

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Plants and/ or plant cells in vitro show physiological and morphological responses to microbial, physical, or chemical factors which are known as “elicitors.” Elicitation is a process of induced or enhanced synthesis of secondary metabolites by the plants to ensure their survival, persistence and competitiveness [1]. Cadmium (Cd) is a non-essential heavy metal and toxic to plants and act as abiotic elicitor [1, 2]. Glycyrrhizic acid (GA) is one of important secondary metabolites in Licorice (*Glycyrrhiza glabra*) roots. It uses for numerous medical purposes, in particular, treatment of peptic ulcers [3]. In this study, the role of Cd as an abiotic elicitor on the yield of glycyrrhizic acid in *glycyrrhiza glabra* var. *glandulifera* is investigated. For this purpose root calli obtained in MS medium with 2, 4- D, BAP and IAA hormones treated by (0, 200 and 400 µM) cadmium chloride (CdCl₂) in MS medium for 14 days. Then amount of glycyrrhizic acid measured by high-performance liquid chromatography (HPLC). The results showed that with enhancement of cadmium concentration in medium increase GA content in Licorice calli. This amount in calli treated by 400 µM Cd was about 17.5-fold higher than control group. Increasing of glycyrrhizic acid as a secondary metabolite is a kind of defence mechanism for resistant to cadmium toxicity by Licorice calli.

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THE EFFECT OF SALICYLIC ACID ON ANTHOCYANIN CONTENT
IN LICORICE

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Plants are valuable source of phytochemicals (secondary metabolites), many of which can be used as additives for functional foods as well as basic compounds for nutraceuticals and pharmaceuticals [1]. But they don't produce sufficient amounts of the required secondary metabolites. The production of secondary metabolites can be enhanced by the treatment of the undifferentiated cells (callus) with elicitors such as Methyl Jasmonate, and Salicylic acid. In the study, the role of Salicylic acid in Anthocyanin production is investigated. Seeds of licorice (*Glycyrrhiza glabra* var. *glabra*) germinated in Murashige & Skoog (MS) medium [2]. For the callus production, root segments were cultivated in MS medium containing 0.1 mg.L⁻¹ 6-Benzyl Amino Purin, 0.5 mg.L⁻¹ Indole3-Acetic acid, 0.5 mg.L⁻¹, 2,4-Dichloro-Phenoxyacetic acid. Calli were treated on the MS medium containing 0 and 5μM Salicylic acid for ten days. Then 500 mg of calli was extracted with ethanol containing 1% HCl and incubated for 24 h at 4°C. After centrifugation, Anthocyanin content in the supernatant was estimated by measuring the absorbance at 535 nm using Shimadzu UV-Visible spectrophotometer [3]. Anthocyanin content in calli treated with Salicylic acid was about two fold (from 2.49 to 6.57mmol.g⁻¹FW). However, Salicylic acid application positively affected the Anthocyanin content of Calli and it can be used as elicitor for the production of Anthocyanin by these tissues.

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**SILYMARIN ATTENUATED THEMYPHENOLATE MOFETIL-
INDUCED VILLOUS ATROPHY AND LIPID PEROXIDATION IN THE
DUODENUM OF RAT**

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Silymarin (SMN) is a polyphenolic flavonoid isolated from fruits and seeds of the Milk thistle (*Silybum marianum*) [1]. Previous studies have showed that many gastrointestinal disorders can be treated and/or prevented by the silymarin preparations [2]. Mycophenolate Mofetil (MMF) is an immunosuppressive compound that has side effects most notably the gastrointestinal disorders [3]. Thus, this study was designed to evaluate the gastroprotective effect of SMN on MMF-induced gastrointestinal (GI) disorders in rats. Thirty Wistar rats were assigned to 5 groups. The control animals received normal saline and the test animals treated with MMF (30 mg/kg, orally) and saline normal, MMF and SMN (25, 50 and 100 mg/kg, orally) for 14 days. The Malondialdehyde (MDA) production as an indicator of lipid peroxidation in the duodenal region of small intestine was determined. Histopathological examination including the villous height to crypt's depth ratio and goblet cells count also were conducted to show the impact of MMF administration and equally the protective effects of silymarin. The MMF-increased level of malondialdehyde (MDA) were reduced by SMN administration. Histopathological examinations including the villous height to crypt's depth ratio, the MMF-induced villous atrophy and goblet cell reduction were improved in SMN-treated groups. Our data suggest that the MMF-induced GI disorders may attribute to elevated MDA level that result in pathological injuries. Moreover, the biochemical alterations and histopathological damages due to MMF administration were reduced by SMN, indicating its gastroprotective effect.

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**EFFECT OF *CYNARA SCOLYMUS* ON THE FAT METABOLISM
UNDER HEAT STRESS CONDITION IN BROILER CHICKENS**

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Artichoke (*Cynara scolymus* L.), is native to the Mediteranean area and its leaves traditionally have been used by the Eclectic physicians as a diuretic and depurative, for the treatment of rheumatism, jaundice and also as hepatoprotective and antioxidative [1]. To date, no data is available on the effects of artichoke on fat metabolism under stressful condition. Hence, the purpose of this study was to evaluate the effect of *Cynara scolymus* on broiler fat metabolism under heat stress condition.

160 day-old broiler chicks (Ross, 308) were randomly assigned into four dietary treatments with four replicate per treatment (10 birds/pen) in a completely randomized design (CRD) with a 2x4 factorial arrangement (4 treatment diet and 2 different temperatures rearing system). Treatment diets included: 1) control diet; 2 and 3) basal diets were supplemented with 2 levels of artichoke (1.5 and 3 gr/100gr diet) and 4) basal diet was supplemented with 30 mg/100gr diet vitamin E. From d 35 to 42, half of the broiler chickens were exposed to cyclic-heat stress (34±1°C and 75%RH, 6hr/d, 10.00–16.00 h) by increasing the poultry house temperature. Diets were fed from d 1 to 42 with *ad libitum* access and all the birds were reared under continuous lighting. On d 42, four birds from each treatment were bled randomly for blood serum determination of cholesterol, triglycerides and HDL. Results showed that cholesterol and triglycerides levels were influenced by treatments and heat stress interaction, birds fed control treat under heat stress condition had significantly higher cholesterol and triglycerides (P<0.05), while HDL level did not differ.

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**COMPARE OF THE CRATAEGUS EXTRACT AND NIMODIPINE
EFFECT ON PASSIVE AVOIDANCE LEARNING OF
MALE WISTAR RATS**

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Age-related memory impairment is correlated with increases in the L-type calcium channel [1]. It has been reported that nimodipine and crataegus as a calcium channel blocker prevent the calcium overload and thereby been used in medicine for congestive heart failure and brain stroke[2-4]. In regard to unknown brain side effects of them, the aim of this study was comparison of crataegus extract and nimodipine effect on passive avoidance learning of male wistar rats. 32 adult male wistar rats (250-300 grams) were divided to 4 groups (n=8): intact, Sham (That were received solvent of crataegus extract), treatment1, that gavaged with 100 mg/kg/day crataegus and treatment 2 group, with 30 mg/kg/day nimodipine for two weeks. Passive avoidance learning test performed by shuttle box for all of the groups. Step through latency, time in dark component, and time in light component were considered as passive avoidance learning parameters. SPSS software and one way ANOVA and tuckey tests were used for data analysis. STL in treatment1 was 280 (s) and in treatment2 was 300 (s) that indicated a significant increase ($p < 0.001$) in compare to control group (135 s). TDC was 10, 0, 100 respectively ($p < 0.001$). Crataegus and nimodipine could increase the passive avoidance learning in male wistar rats and probably crataegus extract acts similar to nimodipine as a natural calcium channel blocker and effect on blood vessel and inflammation[5]

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**NAA AND IBA AS PLANT GROWTH REGULATORS FOR MICRO
PROPAGATION OF *THYMUS VULGARIS* L.**

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Thymus vulgaris or common thyme is a low growing herbaceous plant, sometimes becoming somewhat woody, within the Labiate family, the genus *Thymus* [1]. These experiments have been done with the aim of micro propagation of *Thymus vulgaris* L. with utilization of single node explants. MS basal medium complimented with different NAA concentrations (0, 0.01, 0.02, 0.04, 0.08 mg/lit) was used as stem initiation media. Having remained around one month in this medium, we transferred plantlets to MS basal medium complimented with different concentrations of IBA (0, 0.5 and 1 mg/lit) for root initiation. Results showed that there are not significant differences among different concentrations of NAA; however, plantlets which grew in NAA at each concentration were stronger and more vigorous than control. Proliferation was increased by increasing NAA concentration to 0.08 mg/lit but internode length was decrease simultaneously. Different concentrations of IBA did not affect rooting and there was not significant difference among them in all evaluated characteristics like number of root, root length and the length of longest root. It means that rooting could be happened in MS basal medium and no hormoneis necessary to be added. In this experiment the percentage of root and shoot initiation was 100%.

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**RECYCLING PREPARATIVE HIGH PERFORMANCE LIQUID
CHROMATOGRAPHY FOR SEPARATION OF THE CURCUMIN
FROM CURCUMINOIDS PRESENT IN
*CURCUMA LONGA L.***

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This study focused on recycling preparative HPLC method for isolation of curcumin from other curcuminods in *curcuma longa L.* Curcumin is the main bioactive compounds of curcuminoids. And this compound has many pharmacological applications. So, isolation of curcumin from other components with higher purity is important process. In this study, after optimization of extraction process, preparative HPLC system was first applied to separation of curcumin using methanol–water (1:1, v/v) as the two-phase solvent system. Because of poor resolution, higher pure curcumin could not achieve. So, switching from preparative HPLC to recycling preparative HPLC selected to overcome the problem of poor resolution. This caused to get improvement in separation factors which led to increasing of curcumin purity up to 99.5%.



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**IN VITRO MICROPROPAGATION OF
LAVANDULA ANGUSTIFOLIA L.**

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Lavandula angustifolia is one of the most important medical and aromatic plants. It usually in traditional methods with root cutting or seed was propagated. Propagation with seed is time consuming. Also, Due to the slow growth and hard rooted cuttings of some hard figures, it is not efficiency that propagates with root woody cuttings. So, *in vitro* cultivation provides possibility to increase propagation speed. *In vitro* cultivation in *L. angustifolia* plant always faced to some problems because of existing plant phenol. Generally *L. angustifolia* propagation begins with using Lateral bud growth medium which have cytokinin. In this study, we used from tissue culture technique to propagation these valuable plants. Different levels of hormones used to direct regeneration from plant different subspecies of *Lavandula angustifolia*. We used Factorial experimental design with 3 factors and 3 repetitions. among replaced species , best results of regeneration and emerging seedling was earned from stem subspecies and in MS medium contain 2 mg.l⁻¹BAP and 2 mg.l⁻¹ kinetin.

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**EVALUATION ON THE EFFECTS OF NITROGEN AND POTASSIUM
FERTILIZERS ON GROWTH AND YIELD OF ROSELLE (*HIBISCUS
SABDARIFFA* VAR. L.) IN IRANSHAHR**

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Roselle (*Hibiscus sabdariffa* L.) has considerable economic importance in the western Sahel. A farm experiment was carried out during April 2012 in Baluchistan Natural Resources and Agricultural Research Center, Iran (latitude 27°11' N Longitude 60°29' E), to study the effects of nitrogen and potassium fertilization on growth, yield and yield components of Roselle. A split-plot design with three replications was used. Treatments were four levels of N (0, 50, 100 and 150 kg N ha⁻¹) in main-plots and three levels of K (0, 50 and 100 kg k ha⁻¹) which were located in sub-plots. Data were collected on plant height, calyx and seed yield of Roselle. Results indicated that the effect of N and K on yield and growth of Roselle was significant. Nitrogen application enhanced growth parameters *viz.*, plant height, canopy diameter and number of branches per plant and yield and yield attributes of Roselle compared to control. K fertilization also, improved growth parameters as well as yield and yield attributes, fresh weigh, calyx weight and harvest index. Base of these experiment results, the application of N and K for enhancing the growth and productivity of Roselle is recommendable.

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**BIOLOGICAL ACTIVITIES OF *STACHYS KERMANSHAHENSIS* RECH.
F. ESSENTIAL OIL**

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The genus *Stachys* which belongs to the Lamiaceae family is found in mild regions of the Mediterranean and in southwest Asia. This genus consists of 270 species widespread throughout the world. Among the 34 species present in Iran, 13 species are endemic such as *Stachys kermanshahensis* [1]. The plant is known as Chaye-kuhi or sonboleii in Iran [1, 2]. It is used as the herbal tea in gastrointestinal disorders [2]. The extract of the aerial parts of *S. inflata* and *S. sieboldii* showed potent anti-inflammatory activity and anti-anoxia action respectively [3]. The essential oil of some species of *Stachys* has been reported [4]. The essential oil from *Stachys kermanshahensis* (collected from Ilam province) obtained by hydrodistillation has been analyzed by GC and GC/MS. The main components were (Z)-alpha-copaene-8-yl (O-tert-butylphenoxy) benzoate (14.6%), linalool (9.0%) and (E)-nuciferyl isobutyrate (7.5%). The antimicrobial activity of oil was determined against some bacteria and fungal strains. Also the oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests.

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**EFFECT OF OLIVE LEAVES AS A PHYTOBIOTIC FEED ADDITIVE
ON PERFORMANCE, ANTIOXIDANT STATUS AND ASCITES
MORTALITY REDUCTION IN BROILER CHICKENS**

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The first formal report of medicinal use of olive leaf was published in 1854. Olive leaves antioxidant properties are well described. This research was conducted to study the effects of antioxidant properties of olive leaves on growth performance, serum antioxidant status and ascites mortality reduction in male broilers under normal and cold temperature conditions. A total of 400 day-old male broilers were divided into four experimental groups including control group (NT₁), and three groups with olive leaf supplementation at 5, 10, or 15 g/kg diet (NT₂, NT₃, NT₄) with four replicates of 25 birds per pen for the normal temperature conditions. The same grouping with another 400 birds was used for the cold temperature conditions (CT₁, CT₂, CT₃, CT₄). Growth performance, serum total antioxidant status and ascites indices, right ventricle [RV], total ventricle [TV] weight and RV/TV ratio, were evaluated. Chickens were closely monitored for mortality three times daily and all the dead birds were removed, weighed, examined grossly for lesions and analysis at the end of experiment. At the end of each experiment, blood samples were taken via wing vein from 12 birds per group to determine serum total antioxidant status. Moreover, 40 birds were randomly selected and slaughtered, to determine right ventricle (RV) and left ventricle (TV) weights. The results showed that there were significant differences in serum total antioxidant status among treatments under normal and cold temperature conditions ($P < 0.001$), which their average were 0.306, 0.312, 0.382, 0.388, 0.483, 0.514, 0.926 and 0.577 mmol/lit for treatments NT₁, NT₂, NT₃, NT₄, CT₁, CT₂, CT₃ and CT₄, respectively. Except mortality, there were no significant differences between treatments in performance under both temperature conditions. Increasing olive leaf supplementation was associated with a linear decrease in RV/TV under the normal temperature condition and a linear increase in RV, TV, and RV/TV under cold stress ($P < 0.001$). It could be concluded that dietary olive leaf supplementation at a dose of 10 g/kg diet decreases ascites incidence and increase serum total antioxidant status without impairing broiler performance under normal and cold ambient temperatures.



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**FUMIGANT TOXICITY OF ESSENTIAL OILS OF *MENTHA PIPERITA*
AND *MENTHA SPICATA* ON ADULTS OF THE BLACK BEAN APHID,
APHIS FABAE SCOPOLI (HEMIPTERA: APHIDIDAE)**

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The black bean aphid, *Aphis fabae* is oligophagous pest and due to direct damage in plant and virus transmission is important in sugar beet. This aphid is vector of 30 virus pathogens in plants [2]. Effective factors in the damage reduction of *A. fabae* are to use of chemical pesticides. But due to the cumulative effect in the living organism tissue, adverse effects are on the environment health and mammals particularly to human. Plant essential oils can be used as effective fumigant against different pests and not only are effective in pest control but rather are compatible with the environment and their adverse effects are less than other methods of chemical control. In this research, insecticidal activity of *Mentha spicata* (Lamiaceae) and *Mentha piperita* (Lamiaceae) was studied on the black bean aphid in the laboratory condition under 25±2°C and 65±5% RH. Leaf disc method was used for colony formation of *A. fabae*. A Number of viviparous female aphids were placed on each leaf. For survival of leaves, end of leaves was placed in wet cotton. The leaves were replaced every two to three days once with fresh leaves. The plant essential oils was obtained using a modified Clevenger-type apparatus with 100 g dry and a liter of water for 3 hours [1]. After performing preliminary experiments, the concentrations creating between 20% and 80% mortality were selected as the lowest and highest effective dose for bioassay experiments. Mortality was evaluated at six different concentrations that ranging from 2.35 to 37.65 µL/L air, and with 6 replications at the interim 24 hours. At the highest concentration (37.65 µL/L air) the mortality were recorded as 75% for every two essential oils. At the lowest concentration (2.35 µL/L air) the mortality were not observed for both essential oils. The results showed that by increasing dose and time, mortality rate was also increased. These results showed that of *M. piperita* oil (LC₅₀=19.29 µL/L air) was more toxic than *M. spicata* (LC₅₀=11.27 µL/L air) on the black bean aphid, *A. fabae*. So it is better in the struggle against this pest to use more than *M. piperita* essential oil until be more efficiency in pest control. Use of plant essential oils are effective methods and useful in pest control and can be used in IPM program.

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INSECTICIDAL ACTIVITY OF *SALVIA OFFICINALIS* ON THE BLACK BEAN APHID, *APHIS FABAE* SCOPOLI (HEMIPTERA: APHIDIDAE) IN LABORATORY CONDITIONS

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In recent decades, using of chemical pesticides for pests control in a wide range has been caused adverse environmental consequences. Plant essential oils are aromatic connections obtained by steam distillation, medicinal aromatic plants [2]. These oils are rich source of bioactive compounds and in terms of biological are considerable decomposition and low risk is for mammals. Therefore use of essential oils is regarded by environmentalists due to very short-term persistence in the environment. In this research, susceptibility of adult of the black bean aphid to essential oil of *Salvia officinalis* (Lamiaceae) plant was studied under laboratory conditions, 25±2°C and 65±5% RH. For extraction of essential oil, a hydro distillation apparatus (Clevenger) was used and extracted essential oils were kept in a conventional refrigerator in 4°C and away from light until using in experiments. Mortality was evaluated at 5 different concentrations that ranging from 8.82 to 108.82 µL/L air, and with 6 replications at the interim of 24 hours. In each repetition 15 adult aphids of the black bean aphid was placed on acacia leaf with dimensions of 5×5 cm² for each concentration. The desired essential oil was released on the filter paper in the inner surface of containers. The influence of different concentration of *S. officinalis* on the mortality rate of adult of the black bean aphid was significant. Results showed the mortality rate at the highest concentration (108.82 µL/L air) for this oil was 75%. Also at the lowest concentration (8.82 µL/L air) the mortality of aphid was not observed for these essential oils. LC₅₀ value for *S. officinalis* after 24 h fumigation was 41.18 µL/L air. Throughout the world has increased tend to use of alternative compounds including essential oils of different plants that most are like poison common gas and has lethal effects on different stages of pests [1]. Therefore, the obtained results can be paved the way for use of non-chemical and environmentally friendly methods to management of *A. fabae*.

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COMPARISON OF NYMPH PRODUCTION DETERRENT EFFECT OF
ESSENTIAL OIL OF *FONICULUM VULGARE* MILL. ON THE
CABBAGE APHID, *BREVICORYNE BRASSICAE* L. AND THE BLACK
BEAN APHID, *APHIS FABAE SCOPOLI* (HEMIPTERA: APHIDIDAE)

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Danger of the use of chemical pesticides on the environment and the possibility of residual pesticides in plant products such as cruciferous plants (*Brassicaceae*), also attention to aphids as major pest which are vectors of virus infections and the other hand diversity of essential oils against the pests and their less persistence in the environment was provided suitable conditions for this study. This research was aims to study the deterrent effect of essential oil of *Foeniculum vulgare* (*Apiaceae*) on the cabbage aphid, *Brevicoryne brassicae* and the black bean aphid, *Aphis scopoli*. The plant materials used in this study were collected from medicinal plants field of Shahed University in 2011. The plant essential oils were obtained using a modified Clevenger-type apparatus through hydro distillation [1]. For extraction of essential oils, 100 g of powdered plant with one liter of water was poured in the apparatus and extraction of essential oils was done at three hours. Experiments were tested at different concentrations of *F. vulgare* on the cabbage aphid ($LC_{10}=3.41$ and $LC_{25}= 7.29 \mu\text{L/L air}$) and the black bean aphid ($LC_{10}=1.12$ and $LC_{25}= 1.94 \mu\text{L/L air}$) in the laboratory conditions: $25\pm 2^\circ\text{C}$ and $65\pm 5\%$ RH and at the interim of 24 hours in ten replications with four adult aphids and in a completely randomized design. The results showed that there is significant difference between deterrent effects of these two pests at LC_{10} and LC_{25} concentrations. So that the maximum deterrence percentage was related to LC_{25} of *F. vulgare* on the cabbage aphid (84.83%) and the lowest belonged to LC_{10} of *F. vulgare* on the black bean aphid (28.24%). Also deterrent effect of *F. vulgare* on these two pests in LC_{25} concentrations group was greater than LC_{10} . These results showed that toxicity of *F. vulgare* on the cabbage aphid is more than toxicity of *F. vulgare* on the black bean aphid.

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COMPARISON OF NYMPH PRODUCTION DETERRENT EFFECT OF
TWO ESSENTIAL OILS OF *SATUREJA ISOPHYLLA* RRCH. AND
ELETTARIA CARDMOMUM MATON ON THE CABBAGE APHID,
BREVICORYNE BRASSICAE L. (HEMIPTERA: APHIDIDAE)

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The cabbage aphid, *Brevicoryne brassicae* is one of the important pests with broad host range that does damage to cruciferous (*Brassicaceae*) plants. This pest in addition to reducing market value of *Brassica* products is able to transmit a number of plant viruses [1]. Effects of certain plant essential oils have an old reputation as a natural deodorant and flavors in the perfumery industry and food storage and also have been proven in pest control. Recent researches in different countries has confirms that plant essential oils are not only used in pest control, but their insecticidal effects have been seen as contact and fumigation in combat with certain pests. Antibiosis activity of essential oils and their effects on insect growth parameters has been proved [2]. In this research, nymph production detergency activity of *Satureja isophylla* (Lamiaceae) and *Elettaria cardamomum* (Zingiberaceae) was studied on the cabbage aphid in the laboratory conditions: 25±2°C and 65±5% RH. For extraction of essential oil, a hydro distillation apparatus (Clevenger) was used and extracted essential oils were kept in a conventional refrigerator in 4°C and away from light until using in experiments. The desired essential oil was released on the filter paper in the inner surface of containers. In each of tested container (with dimensions of 5 × 5 cm²), four adult aphids were placed on the cauliflower leaf. Detergency effect was tested at LC₁₀ and LC₂₅ concentrations for *S. isophylla* (1.47 and 13.53 μL/L air) and for *E. cardamomum* (4.18 and 9.18 μL/L air) at 72 hours intervals and was daily checked. 10 replications were used for each experiment. After counting, produced nymphs were removed from test containers. Statistical analysis showed that there is a significant difference between LC₁₀ and LC₂₅ of *E. cardamomum* and *S. isophylla*. So that the deterrence percentage were recorded for *E. cardamomum* (93.03% and 92.62%) and for *S. isophylla* (29.09% and 90.57%) in LC₁₀ and LC₂₅ concentrations, respectively. These results showed that toxicity of *E. cardamomum* is more than *S. isophylla* on the cabbage aphid.

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**INSECTICIDAL ACTIVITY OF TWO MEDICINAL ESSENTIAL OILS
OF *CINNAMOMUM ZELANICUM* AND *FOENICULUM VULGARE* ON
THE CABBAGE APHID, *BREVICORYNE BRASSICAE* L.
(HEMIPTERA: APHIDIDAE)**

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Many species in the plant kingdom synthesize a variety of secondary metabolites which play a role in the defense of plants against arthropods. Phytochemicals are usually less environmentally harmful than synthetic agrochemicals [1]. This research was aims to study the insecticidal effects of two essential oils of *Cinnamomum zeylanicum* (Lauraceae) and *Foeniculum vulgare* (Apiaceae) on the cabbage aphid, *Brevicoryne brassicae*. The plant essential oils were obtained using a modified Clevenger-type apparatus through hydro distillation. Mortality was tested at 6 different concentrations that ranging from 0.71 to 26.78 $\mu\text{L/L}$ air, and 6 replications at the interim of 24 hours under conditions of $25\pm 2^\circ\text{C}$ and $65\pm 5\%$ RH. At the highest concentration (26.78 $\mu\text{L/L}$ air), *F. vulgare* and *C. zeylanicum* oils caused 88.3% and 83.3% mortality on the cabbage aphid, respectively. At the lowest concentration (0.71 $\mu\text{L/L}$ air) the mortality were recorded as 6.66% for *F. vulgare* and 1.60 % for *C. zeylanicum* oils. The results showed that by increasing dose and time, mortality rate and insecticidal activity was increased. The essential oil of *C. zeylanicum* ($\text{LC}_{50}=8.39$ $\mu\text{L/L}$ air) has stronger activity than *F. vulgare* ($\text{LC}_{50}=10.32$ $\mu\text{L/L}$ air) on the cabbage aphid, *B. brassicae*. Due to the increasing cost of spraying and harmful effects of chemical pesticides on the environment and the possibility of residual toxins on the cruciferous plant products, other organisms and the environment, botanical insecticides can be used as one of the alternative suitable methods for pest management and reduce environmental pollution.

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**SILYMARIN RESTORED THE PANCREATIC BETA CELLS IN
STREPTOZOTOCIN-INDUCED DIABETIC RATS**

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In our previous study it has been demonstrated that silymarin (SMN) can recover the hepatic glycogen resources in hepatocytes of diabetic rats [1]. Additionally, both pre-clinical and clinical studies are indicating that SMN exerts anti-diabetic effects [2]; however, direct effect of SMN on restoring of the pancreatic β cells has not been fully elucidated. The current study aimed to investigate the effect of SMN on pancreatic β cells in STZ- induced diabetic rats. Type 1 diabetes was induced by a single i.p. injection of a freshly prepared solution of STZ (50 mg/kg/BW) in four groups from 5 study groups (n=6). The control group received only the STZ solvent (citrate buffer). The diabetic rats were treated either with saline normal (D), or with SMN (50 mg/kg/BW, p.o.), MEL (10 mg/kg/BW, i.p.) and SMN+MEL for 28 executive days. The blood glucose level and serum level of insulin were measured. Histopathological and histochemical examinations to clarify the pancreatic damages and given compounds protective effect were performed. The obtained results revealed that SMN but not MEL was able to restore the pancreatic β cells. The biochemical assays including serum level of insulin measurement supported this findings as in the SMN-treated diabetic group the serum level of insulin ($701 \pm 9 \mu\text{U/ml}$) was recovered in comparison to non-treated diabetic rats ($425 \pm 32 \mu\text{U/ml}$). Although MEL alone was able to recover the serum level of insulin slightly but it was found non-significant ($P>0.05$). The combination of SMN and MEL neither improved the insulin level nor restored the pancreatic β cells in the diabetic rats. Our data indicate that SMN as an antioxidant could be a novel agent in the treatment of diabetes as both biochemically and histopathologically showed promising impacts.

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**EFFECTS OF ENVIRONMENTAL FACTORS ON ROOTING OF
(*PISTACIA MUTICA*) MICROPROPAGATION**

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Pistacia mutica is a dioecious plant and an important rangeland and forest tree in Iran and some neighbouring countries. Almost 2.2 million of 12 million hectares of rangeland and forests of Iran are covered by *P. mutica*. It plays an important role in the life and economy of many villagers in different parts of these countries. *P. mutica* Latex is one of the important side-products of *P. mutica*. Latex is a colourless, bitter and viscous liquid that in the atmosphere gradually tends to be semi-solid. Latex is being used as a medicinal and industrial material. Rooting in plant micropropagation especially woody plants usually is being faced with problems. The effects of 4 different culture conditions were studied in this research:

Condition A: Agar-solidified medium covered with light impermeable polypropylene. Culture vessels were covered with filtered polypropylene (Sun cap) closure (RH = 89±1%). The lower parts of the culture vessels were covered with aluminium foil to prevent light penetration into the media.

Condition B: Agar-solidified medium covered with transparent polypropylene and the culture vessels were closed with Sun caps (RH=89±1%). Condition C: Agar-solidified medium without medium surface cover and with polypropylene closure (RH=99±1%). Condition D: Liquid medium with Surbarod^{®2} plug in tubes and culture vessel closed with Sun caps (RH=95±1%). Results revealed that Conditions A and B produced a significantly higher root length, number of roots per plant and percentage of rooted plants as compared to Conditions C and D. Root length in Condition A was significantly higher compared to conditions B, C and D. Plants cultured on liquid medium in Condition D resulted in the lowest root production and percentage of rooted plant (1%). Darkening the bottom end of plantlets and reduction of relative humidity of plantlets head space was highly effective in root induction and root growth.



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STUDIES ON BACTERIAL CONTAMINATION OF *PISTACIA MUTICA* SEEDS AND LEAVES THROUGH DNA FINGERPRINTING

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P. mutica (Baneh) is a forest, medicinal and industrial rangeland tree in many parts of Iran. It is also being used as rootstock for *P. vera*. This Dioecious plant can be propagated by seed, but seed germination in the natural habitat is usually below 10%. The germination of the seeds of *Pistacia mutica* from 7 different parts of Iran (Sanandaj, Yasuj, kerman, Ilam, Tabriz, Fars and Khorasan) was assessed in this investigation. It was found that the main reason of low germination is decay of cotyledons based on the bacterial contamination. The plants grown in glasshouse which were used for micropropagation, also showed bacterial contamination. But this was not so effective on the *in vitro* micropropagation of micro shoots of *P. mutica*. The relationship between the bacteria inside the seeds and the plant was also one of the objectives of this research. To do this, the seeds and plant materials after sterilization were put in the bacteria growth media TSB (Tryptone Soya Broth) and based on observation, totally 327 bacteria colonies were isolated (253 from the seeds and 74 from the plants). In order to grouping the bacteria accurately, the bacteria DNA were extracted and after estimation the genomic DNA using λ DNA, the PCR reaction technique based on RAPD was used. Several primers of Operon[®] from OPF01 to OPF16 were used to find maximum bands, and at last OPF13 with base sequence of GCTGCAGAA was the best primer for the PCR. By means of this technique for grouping of the bacteria, finally it was revealed that of the bacteria isolated from seeds and plants, 8 colonies in the seeds and 5 in the plants were not similar and 3 colonies of seeds were not exist in the plants. In order to determine the decontamination effects of sodium hypochlorite on the seeds, the seeds were then cut into 4-5 and 8-10 pieces. As the seed pieces were smaller, the decontaminant was able to penetrate the seed cotyledon tissues, and the time of bacteria contamination performance in the TSB was delayed and finally the seed pieces were completely decontaminated. The embryos that were separated from the cotyledons and sterilized (20% hypochlorite for 20min), germinated easily without any bacterial contamination. It is most probably that the source of bacteria was cotyledons.



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**EVALUATION OF THE USE OF HERBAL MEDICINES BY THE
PEOPLE IN THE KARAJ CITY**

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This investigation was carried out with the aim of the role of medicinal plants and herbal products in people life to treat disorders and illnesses. Application of traditional medicine and medicinal plants in Iran for patient treatment (phytotherapy) goes back to hundreds of years ago. Nowadays, it can resolve many healing problems in collaboration with the modern medicinal methods. The herbal products among people are being increasingly accepted every day. In order to assess the acceptance of herbal products by people, this investigation was carried out in Karaj city using a questionnaire of different people with different ages and various studies. The method was based on asking the arranged questions in different places and amongst different age groups of people.

Regarding the questions in the city of Karaj, it was revealed that about 56% of people are familiar with herbal medicines and approximately 45% of them also believe to the efficiency of herbs for treatment. According to the results, 59% of the people thought to replace the chemical medicines with the herbal ones partially, while only about 5% had the opposite view. Of this population, 38.5% state that medicinal plants and herbal medicines are cheaper as compare to chemical drugs for treatment the diseases, and 46% of them use herbal medicines for treatment the illnesses themselves. Approximately 33% of people, who treated with medicinal herbs, visited the doctors and got prescriptions for herbal medicines and have got satisfactory results. Of questioned people 53% are moderately satisfied from the results of herbal medicines. In this research, 49.5% of people believe that the publicity on the benefits of medicinal plants is weak.



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**INVESTIGATION ON DEVELOPMENT AND PROMOTION OF
HERBAL MEDICINES IN KARAJ PHARMACIES**

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With the advent of chemical and biological drugs, the role and importance of medicinal plants and herbal medicines in improving human health were gradually neglected. But over the time, embracing the medicinal plants has been met with significant daily growth. In order to find out the role of pharmacies in the development and promotion of medicinal plants and herbal medicines, this research was carried out during the summer 1389, from the pharmacies of the Karaj city. The method of investigation was based on the questionnaires conducted and filled in person. Questionnaire included 10 questions that was analysis and used after filling by the people. The results of this study revealed that nearly 59% herbal users are middle-aged. However, 60% of the people instead of using herbs, they use herbal products. Only 10 to 30% prescriptions are herbal medicines. According to this research, 70% of applicants apply herbal medicines without a prescription and 62% of people prefer phytotherapy. However, 60% of pharmacies operators, state that the herbal medicines are not appropriate substitute for chemical drugs and 97% of them state that revitalization with chemical drugs are more rapidly than herbal medicines. 80% of the directors of pharmacies stated that herbal products are without any insurance coverage. According to the answers, 50% of pharmacies supply their herbal medicines from legal pharmaceutical companies.



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IN VITRO CULTURE OF *PISTACIA MUTICA* (BANEH)

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P. mutica (Baneh) is a forest, medicinal and industrial rangeland tree in many parts of Iran. It is also being used as rootstock for *P. vera*. This Dioecious plant can be propagated by seed, but seed germination in the natural habitat is usually below 10%. The current investigation was designed to develop a protocol for *in vitro* propagation of *P. mutica* in a factorial completely randomized design with 20 replications. Seeds were collected and germinated under glasshouse conditions. Nodal segments from cuttings of glasshouse-grown plants were exposed to various tissue culture media including Murashige and Skoog, Woody Plant Medium, Alderson, B5 and a combination of these. Significant differences between the media on shoot growth and proliferation were not observed. Various cytokinins as phytohormones including BAP, Zeatin, and 2-ip were used for shoot growth and proliferation. Finally, BAP at 20 μ M was the most efficient in this research.

In vitro rooting was assessed employing various auxins including IAA, IBA and NAA. Exposure to IBA at 100 μ M for 5 days led to a significant improvement of root production. Environmental conditions on rooting and weaning were also studied. Incubation of explants in darkness did not affect root production, but shading of the basal part of explants increased rooting significantly. Reduction of culture vessel headspace humidity from 99 \pm 1% in the conventional culture system to 89 \pm 1% in an improved culture system increased rooting significantly. Culture in liquid medium did not result in any root production.



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**THE EFFECTS OF RED DRIED STIGMAS OF *CROCUS SATIVUS*
L.FLOWERS (SAFFRON) ON GROWTH AND MATURATION OF
OOCTES IN FEMALE THREE SPOT GOURAMI
(*TRICHOGASTER TRICHOPTERUS*)**

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In the present study the effect of hydraulic saffron (*Crocus sativus*) extract on growth and maturation of oocytes in female three spot gourami were investigated. The study consisted of 60 immature three spot gourami fishes with mean weight 1.5-2g that were divided into six groups. The experimental groups received 10, 20, 30 and 50 body weight extract, respectively over a twenty day period. The control group was untreated and the sham group received only distilled water. After 20 days, ovaries were removed, sectioned and examined by light microscope. Mean of gonadosomatic index percentage were determinate and compared with control groups. The results were analyzed by ANOVA and DUNCON test. Statistical analysis of the results showed a significance increase ($p \leq 0.05$) in growth and maturation of oocytes. Histological studies of the ovarian sections showed that administration of 30 and 50 extracts enhanced folliculogenesis in the ovary.

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FOLIAR APPLICATION OF SALICYLIC ACID CHANGES ESSENTIAL OIL CONTENT AND COMPOSITIONS OF PEPPERMINT (*MENTHA PIPERITA* L.)

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The interest in using natural compounds from medicinal plants recently attracted more attention in the world [1]. So that the international business in medicinal and aromatic plants (MAPs)-based product has increased in recent years. In other hands Iran with a long variety in climatic and plant genetically reserves, is one of the richest in the world. Peppermint (*Mentha piperita*) is an important perennial herb from Lamiaceae family. In order to study different concentrations (0, 75, 150, 300, 450 mg/L) of salicylic acid (SA) on essential oil of peppermint an experiment was conducted in the research field station of Faculty of Agriculture, Shiraz University. The experiment was arranged in a Randomized Complete Block Design (RCBD) with 4 replications. Salicylic acid treatments applied to the plants in three stages namely two month after transplanting in vegetative stage of plants, 10 days after first spray and beginning of flowering. Plants harvested at 50% flowering. The essential oil samples obtained by hydro distillation of dried aerial parts using Clevenger apparatus. The essential oils were analyzed by GC and GC/MS instruments. Foliar spray of peppermint with SA increases essential oil content compared with their corresponding control ($\alpha \leq 0.05$). SA changes essential oil content and compositions in different plants [2, 3, 4]. In the present work the highest amount (2.55%) of essential oil was obtain in 150 mg/L SA. It may be due to higher nutrient uptake or leaf oil gland number. Moreover, higher concentrations of SA caused decrease in essential oil content but it did not change the components of the peppermint oil. The essential oil of all samples include 41 compounds which among them Mentone (15.84 -18.1 %), Menthol (46.34 -47.42%) and Methyl acetate (8.47 – 9.7 %) were the major ones.

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**CUMULATIVE EFFECTS OF NEEM EXTRACTS ON BIOENERGETIC
RESOURCES IN ADULTS OF COLORADO POTATO BEETLES,
LEPTINOTARSA DECEMLINEATA
(COLEOPTERA.: CHRYSOMELIDAE)**

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Neem is a tree that is commonly used for its medicinal properties. The bark, seeds, oil, leaves, and other parts of the tree are used to make a variety of different herbal remedies. Additionally, neem oil is used as a natural pesticide, and the plant's twigs are used as natural [1]. The goal of this experiment is to determine the cumulative effects of neem extracts on carbohydrate, lipid and protein reserves in Colorado potato beetle (CPB). So in first experiment, both of plants and adults of second generation (overwintering adults) sprayed with specific concentration of neem extract (750, 1000, 1500 and 0 ppm) in field conditions and adults were sampled in 3, 6 and 12 days intervals after spraying. In second experiment, the sprayed adults resprayed with neem extracts in same concentrations levels after a week and adults were resampled in 3, 6 and 12 days intervals after spraying. The carbohydrate and lipid quantity of four males and females, separately, determined with Van Handel method [2] and protein determined with (Yee & Chapman, 2008)[3] in milligram per gram of fresh weight. Data were analysed in factorial trial in randomized complete design. Results showed neem spraying and resprayed, after a week, significantly affected on carbohydrate, lipid and protein reserves ($p < 0.001$). Also sampling time intervals influenced on sugar, lipid and protein variations ($p < 0.01$). Adults treated (male and female) showed significant differences in protein ($p < 0.001$) and lipid ($p < 0.05$). Sugar reserves, that calculated as $(\text{mean of item in treatment} - \text{mean of it in control}) / \text{mean of it in control} * 100$ showed reduction in concentrations 750, 1000 and 1500 respectively as %51.13, %41.08, %75.33 in first spraying and %26.98, %48.30, %79.75 in respraying tests. In glycogen, percent of reductions in 1000 and 1500 levels were respectively %28.81, %62.06 in first and %20.45 and %58.51 in second (respraying) tests. Adversly, it increased in concentration 750 ppm as %25.60 in first and %24.36 in second tests. In concentrations 750, 1000 and 1500, protein respectively increased as %20.01, %6.27, %23.64 in first experiment and showed reduction %11.45, %36.49, %12.12 in second tests. In lipid, Percent of reduction in 750, 1000 and 1500 were respectively %57.66, %63.66, %79.84 in first and %72.89, %80.16, %85.57 in second tests. Results indicated that neem extract has cumulative effects on carbohydrate, lipid and protein reserves in some concentration levels in adults of CPB.



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CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITIES OF
SALVIA COMPRESSA ESSENTIAL OIL

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The genus *Salvia* L. is one of the largest members of the Lamiaceae family and includes about 900 species distributed all over the world. In flora of Iran this genus is represented by 61 species, 17 of which are endemic [1]. Members of the genus *Salvia* and especially the wellknown species *S. officinalis* have been shown to possess a significant array of biological and pharmacological properties such as spasmolytic, astringent and antiseptic [2]. In folk medicine of Iran, decoction of the leaves of *S. mirzayanii* (local name: Moor Talkh) was used for stomach pain and infusion of the flowers of *S. hydrangea* (local name: Gol-e Arooneh) for treating colds [2]. The literature survey revealed that antimicrobial activity of the essential oils of *S. mirzayanii*, *S. hydrangea* and *S. santolinifolia* [2] although there are several reports on the compositions of the essential oils of some Iranian *Salvia* species [2]. The essential oils two samples of *S. compressa* from provinces of Lorestan, obtained from the aerial parts by hydrodistillation, have been analyzed by GC and GC/MS [3]. The main components of sample (A) were β -caryophyllene (21.4%), α -pinene (18.4%) and caryophyllene oxide (13.2%), and sample (b) were β -caryophyllene (21.1%), 3-thujopsanone (15.3%), germacrene D (12.6%), bicyclogermacrene (11.6%) and nerol (10.7%). The essential oil from *S. compressa* (collected from Chaharmahal-Bakhtiari province), obtained by hydrodistillation, has been analyzed by GC and GC/MS. The major constituents were geraniol (37.8%), nerol (20.3%) and linalool (5.6%). The antimicrobial activity of oil was determined against some bacteria and fungal strains. Also the oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests.

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**EVALUATION OF SALICYLIC ACID ON TOLERANCE TO SALT AND
ALKALI STRESSES IN PEPPERMINT (*MENTHA PIPERITA* L.)**

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In order to study the effect of salicylic acid on tolerance to salt and alkali stresses and yield and essence of peppermint (*Mentha piperita* L.) a pot experiment was conducted in greenhouse with 18 factorial treatments and three replicates. The experimental design was as two levels of salt stress (0, 150 mM of NaCl and Na₂SO₄ with 1:1 ratio), three levels of alkali stress (0, 50, 150 mM of NaHCO₃ and Na₂CO₃ with 1:1 ratio), and three levels of salicylic acid (0, 0.75, 1.5 mM). Fresh and dry herb yield, leaf area/plant, number of leaves and essence percentage were measured. The results showed that salt stress had negative effects on growth, yield and its components in Peppermint. It reduced total yield, fruit weight, height, leaf area/plant, diameter of stem, fresh and dry herb yield, and chlorophyll. The salt stress had more negative effect on yield and its components than alkali stress and maximum reduction in yield belonged to synchronous application both stresses. There was an interaction between salicylic acid and salt and tolerance to alkali stresses on fresh and dry herb yields, number of leaves and essence percentage. We found that in the most characters, 0.75 mM of salicylic acid was more effective than 1 mM. In general, we can conclude that the negative effect of salt and alkali stresses on growth and yield of Peppermint may mitigate by using of salicylic acid.

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**EVALUATION OF GROWTH RESPONSE IN *ECHINACEA PURPUREA*
TO APPLICATION OF ZINC SULPHATE UNDER DROUGHT STRESS**

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Purple Coneflower by scientific name of *Echinacea purpurea* (L.) Monch is a perennial and grassy plant. One of the main benefits of this plant is increasing the immunity power of body against the illness factors (1). In order to study the effects of foliar application of zinc sulphate on growth and percentage of essence of *Echinacea purpurea* under water stress, an experiment was carried out by Split plot method on the base of RCBD with three replications in the agricultural research station of Islamic Azad University, Tabriz Branch in 1390-91. Experimental treatments included water stress as the main factor on 3 levels (irrigate after 70mm evaporation from class A basin, irrigate after 120mm evaporation from class A basin and irrigate after 170mm evaporation from class A basin), Secondary factor as foliar application of zinc sulphate in 2 levels (not application, application of zinc sulphate). The result showed that foliar application of zinc sulphate had meaningful effect on growth and percentage of essence. Application of water stress in Purple coneflower resulted 22.1% decrease in plant height and 18.7% in stem diameter. Microelement application of Zinc caused a rise of plant height and stem diameter in all of level stress condition. The results of this study showed that the highest percentage of essence with 0.782% was obtained with foliar application of zinc sulphate under irrigation after 120 mm evaporation from class a basin. Application of zinc sulphate increased 32.64% percentage of essence.

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**EVALUATION OF THE *ACHILLEA MILLEFOLUM* EFFECT IN
NAUSEA AND VOMITING OF EARLY PREGNANCY**

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Nausea and vomiting in early pregnancy and common symptoms which are a great burden either economically or psychologically on the pregnant women and her family. Considering the fact that pregnant women do not seek appropriate medical treatment because of their concern of drugs side effects on fetus, it seems it would be useful to administer galenic which are accepted as safe drugs, for the first line treatment our purpose was to determine the effectiveness of *Achillea millefolium* for nausea and vomiting of pregnant women with less than 16 weeks of gestational age. In this randomized clinical trial during the spring 2012 on 36 pregnant women with less than 16 weeks of gestational age who had attended clinic in Falavarjan city and randomly selected and the consent of their therapeutic process was as follows: three days prior to the treatment of nausea and vomiting were recorded by using visual criteria. Then the boiled extract of the plant with a concentration of 10% for 3 consecutive days, they recommend 3 cups per day of 8 hours and 2 hours after taking the drug for nausea and vomiting were recorded. The data was analyzed by Wilcoxon sumrank and SPSS software. There was a significant difference in the mean between the severity of nausea and vomiting episodes before and after treatment in three-fold morning, noon and night was shown in the study. *Achillea* is effective in decreasing nausea and vomiting in early pregnancy and it can be administered boiled plant 3 times a day.



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THE INSECTICIDAL EFFECTS OF *LAURUS NOBILIS* AND
MYRTUS COMMONISON ESSENTIAL OILS AGAINST IMMATURE
STAGES OF *EPHESTIA KUEHNIELLA* ZELLER

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Among the plants species, some of them can able to produce secondary metabolites which play a role in the defense mechanisms of plants against arthropods [1]. Phytochemicals are usually less environmentally harmful than synthetic agrochemicals. Mediterranean flour moth, *Ephestia kuehniella*Zeller (Lep.: Pyralidae) is a worldwide pest and its close association with human foods makes it prime target for control methods other than chemical pesticides. At this study, insecticidal effects of two essential oils of *Laurus nobilis* and *Myrtus commonison* on Mediterranean flour moth. Experiments were carried out at controlled conditions (25±2°C and 65±5%RH). Mortality percentages of immature stages were tested at 6 different concentrations ranging from 0.5 to 3.5 µL⁻¹ airs, during several times intervals from 6 to 24 hours with 6 replications. Results showed that with increasing dose and time, percentage of mortality increased significantly. LC₅₀ values after 24 h fumigation with *L. nobilis*were 32.37, 10.67, 18.18 and 26.08 µL⁻¹ airs, for egg, 2th instar larvae, 3th instar larvae and 4th instar larvae, respectively. LC₅₀ values whit *M. commonis*, were 33.37, 17/89, 19/79 and 37/29 µL⁻¹ air, for egg, 2th instar larvae, 3th instar larvae and 4th instar larvae, respectively. The essential oil of *L. nobilishas* stronger activity than *M. commonis* on total immature stages of Mediterranean flour moth.

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**CHEMICAL CONSTITUTES OF THE ESSENTIAL OIL OF
TANACETUM PERSICUM (BOISS.) MOZAFF FROM KALLAR
MOUNTAIN**

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The essential oils of *Tanacetum* species have been the subject of interest to phytochemists due to biological activity as insect antifeedants, antitumor agents, antimicrobial actions, and a host of other health related possibilities due to the content of terpenoids [1]. *Tanacetum persicum* (Boiss.) Mozaff was selected for this study on the probable basis of therapeutic potential evidenced by time-honored claims from traditional medicine use and an extensive chemical and biochemical investigations [2]. *T. persicum* is a small herbaceous perennial; it has a slightly smaller achene type fruit (1-2 mm long). This herb grows naturally in rocky slopes at 2500–3000 meters above sea level in areas Iran [3]. The essential oils of *T. persicum* inflorescences collected from alpine area of Zagros Mountains, Kallar (longitude: 50° 53' E, latitude: 31° 51' N; altitude: 2700-3000 m above sea level) in Chaharmahal va Bakhtiari province, Southwest Iran at June 2012. Gas chromatography (GC) and gas chromatography–mass spectrometry (GC–MS) analyses revealed compounds, constituting 75% of total essential oil. The major constituents of essential oils were borneol, bornyl acetate and linalool. Borneol (C₁₀H₁₈O), a bicyclic monoterpene alcohol and one of the valuable medical materials, senior aromatic spices, and chemical materials, has been widely used in food and drug industries.

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**CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF
VALERINA SISYMBRIIFOLIA VAHL FROM KALLAR MOUNTAIN**

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The roots and rhizomes of *Valeriana officinalis* L. s.l., family Valerianaceae, are used for the preparation of phyto-medicines that are employed as mild sedatives [1]. The essential oil of root and rhizome of *Valerina* (especially *V. officinalis*) contains variety of components with different therapeutically effects such as bornyl acetate, α -pinene and valerenic acid [2, 3]. *Valerina sisymbriifolia* Vahl (locally name “Sonbolotiv-e-Kuhestani”) is a perennial medicinal herb, with height of 50-100 cm. This plant wild grows in different areas of alpine Iran. The root and rhizome of *V. sisymbriifolia* Vahl collected from alpine area of Zagros Mountains, *Tang-e-sayad National Park* (longitude: 51° 06′ E, latitude: 32° 08′ N; altitude: 2430-2500 m above sea level) in Chaharmahal va Bakhtiari province, Southwest Iran at August 2012. The yellow oil of *V. sisymbriifolia* Vahl was obtained by hydro-distillation in the yield of 0.25% based on dry weight. The essential oil of *V. sisymbriifolia* Vahl was analyzed by using gas chromatography–mass spectrometry (GC–MS). A major constitute of the essential oil of root and rhizome of *V. sisymbriifolia* Vahl was valerenic acid.

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THE OVIPOSITION DETERRENCY OF TWO PLANT ESSENTIAL OILS FROM, *LAURUS NOBILIS* AND *MYRTUS COMMONIS* ON THE ADULTS OF MEDITERRANIEAN FLOUR MOTH, *EPHESTIA KUEHNIELLA* ZELLER

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Currently, the plant essential oils are one of the important alternatives to synthetic insecticides especially to control of stored-product pests. Stored products are attacked by different stored-product insects. *Ephesia kuehniella* is one of the most important pests of stored-product [1]. In this research, the effects of plant essential oils from *Laurus nobilis* and *Myrtus communis* were evaluated on oviposition deterreny (OD) of mediterranean flour moth. Each essential oil consists of eight concentrations (from 200-1000 ppm) and each concentration was repeated with five times. In this research, two pairs of adult insects were used. The results showed that oviposition deterreny of this pest was significantly reduced by essential oils. Oviposition deterreny of both essential oils was increased with increase of oil concentrations. At the lowest concentration (200ppm) oviposition deterreny was reached to %65.60 and %83 by *L. nobilis* and *M. communis*, respectively. Also at the highest concentration (1000ppm) oviposition deterreny was reached to %98.20 and %100 by *L. nobilis* and *M. communis*, respectively. According to results, it can be concluded that essential oils from *Laurus nobilis* and *Myrtus communis* also are a significant oviposition deterreny on *E. kuehniella* even at low concentrations.

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THE MEDICINAL EFFECT OF LAVENDER ON NERVOUS SYSTEM

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Today's neurochemical drugs have many side effects but medicinal plants like lavender have not. For a long time lavender has been used for relaxation and its antiseptic effect in traditional medicine [1, 2]. Our aim from this study was about medicinal effects of lavender in medical scientific researches. The effects of hydroalcoholic extracts of *Lavandula vera* on rats' nervous system were investigated.

The data indicated that the Anti-inflammatory and analgesic properties were for the leaf extracts and essential oil of *lavandula*. Antioxidant activity of essential oil has anticancer and pain reliever especially nervous system. Aqueous and methanolic extracts of lavender used in Danish folk medicine for improvement of memory and cognition. It inhibits both development and expression of morphine physical dependence symptoms. Lavender aromatherapy could be a suitable alternative complementary medicine for labor pain and improves anxiety status during labor in nulliparous women and decreases cortisol secretion from adrenal gland and increases serotonin secretion from GI tract. Different doses of extracts of *Lavandula vera* delayed the onset of seizure, but the duration of seizure did not change significantly. Retreatment of animals with different doses of extracts decreased the mortality rate significantly. Finally it may be suggested that lavender could significantly improve deficit of neurocognitive activities in nervous system.

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**INFLUENCES OF SALICYLIC ACID AND DROUGHTS STRESS ON
GROWTH CHARACTERISTICS OF THYMUS DAENENSIS CELAK**

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Salicylic acid (SA) naturally occurs in plants in very low amounts. It has been identified as an important signaling element involved in establishing the local and systemic disease resistance response of plants after pathogen attack [1]. Moisture deficiency induces various physiological and metabolic responses like stomatal closure and decline in growth rate and photosynthesis [2]. *Thymus daenensis* is an endemic subspecies of Iran and grows in high altitudes in Zagros Mountains range [3]. An experiment was conducted in field experimental at Fozveh Station, Researches Centre of Agricultural and Natural Resources, Isfahan, Iran in 2011-2012. A spilt plot experimental in randomized block complete design used with two factors including: (A) normal irrigation (control) and irrigation in 50% field capacity at early flowering until complete flowering in mainplots and, (B) foliar application of salicylic acid (SA) at the rates of 0.0 (SA₀) as a control, 1.5 (SA₁) and 3 (SA₂) molar in subplots. The result of analysis of variance of the experiment showed that different levels of the foliar application of salicylic acid do have no significant impacts on growth characteristics viz. total dry matter and plant height. But foliar applications of SA have signification effect on chlorophyll content per plant ($p \leq 0.05$) and oil yield ($p \leq 0.01$). In finally, interaction effect analysis showed that 1.5 salicylic acid molar \times normal irrigation produced highest oil yield in comparison other treatments.

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**THE REPELLENT EFFECT OF PLANTS ESSENTIAL OILS FROM
LAURUS NOBILIS AND *MYRTUS COMMONIS* ON THE ADULTS OF
MEDITERRANIEAN FLOUR MOTH, *EPEHESTIA KUEHNIELLA* ZELLER
(LEP: PYRALIDAE)**

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Today, to control of stored-product pests the gaseous chemical compound is usually used. These compounds have deleterious effects on non target organisms, environment pollutions, insect's resistance, toxicity to humans and other mammals [1]. In recent years, plants essential oils have received much attention because of their insecticidal, oviposition detergency, repellent effects and antifeedant properties. This study was carried out to evaluate the repellent effects of essential oils from *Laurus nobilis* and *Myrtus communis* against 3 to 5 days adults of *Ephesia kuehniella* Zeller (Lep: Pyralidae). Each essential oil consists of five concentrations (0, 500, 1000, 1500 and 2000 ppm) and each concentration was repeated with five times. Bioassays experiments were performed in 25°C, 65±5 RH and in the dark period at laboratory condition. The result showed that, repellency rate of this pest was significantly increased by essential oils. Repellency power of both essential oils was increased with increase of oil concentrations. %20.38 and %10.59 repellency rates was observed at the lowest concentration (500ppm) of *L. nobilis* and *M. communis*, respectively. Also at the highest concentration (2000ppm) repellency rates were reached to %84.15 by *L. nobilis* and %61.28 related to *M. communis*. As results, it can be concluded that essential oils from *Laurus nobilis* and *Myrtus communis* are considerable repellent effect on *E. kuehniella* even at low concentrations.

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**STUDY OF TISSUE CULTURE AND CALLUS INDUCTION IN
*PAPAVER BRACTEATUM***

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Iranian Poppy (*Papaver bracteatum*) is one of the most important medicinal plants. This plant due to having alkaloids benzylisoquinoline that are adverse group of nitrogen compounds used as an important resource for pain medication such as morphine and codeine, and antibiotics drug like Sanguinarine. Thebaine is the most important secondary metabolites in plants that have a functional role in the production of pain medication. Tissue culture of this plant has been studied to accelerate of achieving thebaine. The study was investigated plant tissue culture in hormone-free medium. Also the best of hormonal treatments tested to achieve the best callus from the best explant. The results showed that the best concentration of ascorbic acid 15 mg/L & 20mg/L & Casein Hydrolyzate 1mg/L & 2.5 mg/L with hormonal treatments of 0.25 BAP mg/L, 2mg/l 2,4-D and 2.5mg/l NAA, 0.1mg/l Kin have brought the best callus induction in this study.[1,2,3]

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**ROOT AND SHOOT GROWTH OF ISABGOL (*PLANTAGO OVATA*)
UNDER ORGANIC MANURE, PHOSPHATE BIO-FERTILIZER AND
CHEMICAL FERTILIZER TREATMENTS**

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In order to investigate the effects of organic manure, phosphate bio-fertilizer and chemical fertilizer on the root and shoot growth of Isabgol, a field experiment was carried out in 2011-2012 growing season at research farm of faculty of agriculture, Zabol University, south-eastern of Iran. The experiment was done using randomized complete block design (RCBD) with four replications. The experiment treatments were include: animal manure (20 ton ha⁻¹) (T1); vermi-compost (10 ton ha⁻¹) (T2); phosphate bio-fertilizer (E-barvar 2) (100 g ha⁻¹) (T3); phosphate bio-fertilizer (E- barvar 3) (100 g ha⁻¹) (T4); phosphate chemical fertilizer (Triple Super phosphate) (50 kg ha⁻¹) (T5); and control (T6). Results showed that the fertilizers treatments had a significant effect on the evaluated traits in the experiment. The effect of vermin-compost on plant height (28.75 cm) was more than other treatments. The maximum numbers of branches, plant fresh and dry weight were related to the animal manure treatments. Organic manure also had effects on root properties, however maximum root length (10.38 cm) was obtained in vermin-compost; moreover effect of animal manure on root fresh and dry weight were more than other treatments.

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ANALYSIS OF THE VOLATILE COMPOUNDS IN *ORIGANUM VULGARE* L. SUBSP. *VIRIDE* USING HS-SPME-GC-MS AND COMPARISON WITH CONVENTIONAL METHOD

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Headspace solid-phase microextraction (HS-SPME) coupled with gas chromatography-mass spectrometry (GC-MS) was used for analysis of the volatile compounds in aerial parts of *Origanum vulgare* L. [1]. Parameters for HS-SPME in terms of fibers type, extraction temperature and time, sample amount and desorption time were investigated. As a result, thirty-five compounds were identified by HS-SPME-GC-MS. The main constituents were thymol (30.3%), α -terpineol (10.1%), (E)-caryophyllen (8.9%) and 1,8-cineol (6.9%). Comparison was made between HS-SPME and conventional hydrodistillation (HD) method. The result showed that HS-SPME is a simple, rapid and effective method and can be used for the analysis of volatile compounds in medicinal plants [2, 3].

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EFFECT OF *CALENDULA OFFICINALIS* POWDER ON BROILER CHICKENS WEIGHT AND LYMPHOID ORGAN WEIGHTS UNDER HEAT STRESS CONDITION

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The function of the chicken innate immune system against pathogens is affected by genetic background and immune modulating diet. In recent years, the encouragement of the poultry immune system by medicinal plant products is becoming an important scientific subject [1]. *Calendula officinalis* is native to the North America Which its leaves traditionally have been used for the treatment of rheumatism, jaundice and also hepatoand renoprotective action of *C. officinalis* has been reported [2]. On the other hand, chronic heat stress is of great concern in all types of poultry production and immune response of broilers can be influenced under heat stress conditions. Unfortunately, comprehensive information on the effects of *C. officinalis* on broiler performance and immune system is lacking. Therefore, the aim of this study was to use of different level of *C. officinalis* on broiler weight of lymphoid organ and body weight under heat condition.

160 day-old broiler chicks (Ross, 308) were randomly assigned into four dietary treatments with four replicate pens per treatment (10 birds/pen) in a completely randomized design with a 2×4 factorial arrangement (4 treatment diet and 2 temperatures rearing system). Treatment diets were: 1) control diet; 2 and 3) basal diets were supplemented with 2 levels of *C. officinalis* (1.5 and 3 gr/100gr diet) and 4) basal diet was supplemented with 30 mg/100gr diet vitamin E. The birds had access to feed and water *ad libitum* and the lighting regimen and ventilation were continuously monitored from d 1 to 42. Commencing from d 35, half of the broiler chickens were exposed to heat stress for 6hr/d (34±1°C and 75%RH). On d 42, two birds from each pen were selected randomly for determination of the weight of lymphoid organ. Our results showed that lymphoid organ weight was not influenced by main effect of treatment diet and heat stress but the weight of the liver was decreased under heat stress condition. Heat stress decreased body weight while body weight did not differ significantly among the 4 diets. In conclusion, more research is needed for medicinal plants and their Immunomodulatory effects.

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DIVERSITY OF CHEMICAL COMPOSITIONS OF ESSENTIAL OIL OF
VARIOUS LANDRACES OF *CUMINUM CYMINUM* L FROM
NORTHEAST IRAN

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Cuminum cyminum L. (green cumin) is a small annual and herbaceous plant belonging to Apiaceae family. Cumin fruits are used as spice and some species economically important and are used as culinary herbs, flavoring agents in perfumery and cosmetics [1]. All the cumin varieties are used in traditional and veterinary medicine as a stimulant, a carminative, an astringent, and as remedy against indigestion, flatulence and diarrhea [2]. In Iranian traditional medicine, the fruits of the plant have been used for remediation of toothache, diarrhea, epilepsy, indigestion and colic, and also to stimulate breast milk production [3]. Essential oils of eleven landraces *Cuminum cyminum* L. Fruit collected from thirty three farms in North, Central and South Khorasan provinces (Northeast Iran) were investigated for their chemical composition. The essential oil yields ranged from 1.4-2.2% (v/w). GC and GC-MS analyses revealed seventeen compounds, constituting 95.2–99.9% of total essential oils. The major constituents of essential oils were safranal, γ -terpinene, γ -terpinene-7-al, cuminaldehyde, β -pinene and *p*-cymene. Results obtained in this study revealed that there is a high potential of variability among Khorasan cumin landraces in essential oil composition. In general, Nayshabor and Esfarrayen landraces contained highest cuminaldehyde which is important in term of aromatic value. These two landraces along with Mahavalat also showed highest antibacterial activity against food born pathogen. These three landraces can be used as a native alternative to synthetic antibacterial in food industry.

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**ENHANCEMENT OF EXTRACELLULAR BACCATIN III
PRODUCTION AND *DBAT* GENE EXPRESSION IN CELL
SUSPENSION CULTURE OF *TAXUS* TREATED BY METHYL
JASMONATE**

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Before the biotechnological production of the anticancer compound taxol can be improved, the mechanism that regulates its biosynthetic pathway needs to be further understood [1]. Taxol is a diterpenoid secondary product obtained from *Taxus* spp. It is currently the best known drug approved for use in the treatment of breast, ovarian, lung cancers, and AIDS-related Kaposi's sarcoma. Baccatin is the last and most important precursor of taxol [2]. Methyl jasmonate is a non-biological elicitor and play a role as a defense signal against pathogen and herbivores attack. It also up regulate genes including in secondary metabolite synthesis [3]. In this paper we have studied the effect of methyl jasmonate (MeJ) on the transcript profile of key gene involved in taxol biosynthesis, *dbat*, in *Taxus*. Here we examine the expression 10-deacetylbaccatin III-10-O-acetyltransferase gene by real-time PCR and amount of extracellular baccatin with HPLC in the cell suspension culture of *Taxus*. Our results showed MeJ treatment clearly increased the expression of the *dbat* gene compare to control it also showed that showed that amounts of baccatin was significantly increased in treated samples compared to control.

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JASMONIC AND SALICYLIC ACID EFFECTS ON CHEMICAL
COMPOSITION OF MELISSA OFFICINALIS L.OIL

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Salicylic acid (SA) naturally occurs in plants in very low amounts. It has been identified as an important signaling element involved in establishing the local and systemic disease resistance response of plants after pathogen attack [1, 2]. Jasmonic acid (JA) and its volatile methyl ester (MJ) collectively termed Jasmonates, are regarded as endogenous regulators that play important roles in regulating stress responses, plant growth and development [1]. A field experiment was conducted in a CRD with three replications and ten treatments in field experimental in Shahrekord (Saman region), Iran at 2012. Experimental treatments included (I) water foliar application (control), (II) water + ethanol foliar application (as a solvent), (III-VI) 50, 100, 200 and 400 Jasmonic acid μL and (VII-X) 1, 10, 40 and 100 molar Salicylic acid. The essential oils of *Melissa officinalis* L. Obtained by hydro-distillation, were analyzed by Gas Chromatography-Mass Spectrometry. The result of analysis of variance of the experiment showed that different levels of the foliar application of jasmonic acid and salicylic acid do not have significant impacts on chemical constituents in the essential oil of *Melissa officinalis* L. The results showed that the major components of the oil were geraniol (34-41%) and nerol (27-34%). In finally, foliar application of 400 Jasmonic acid μL on some of secondary metabolite production in *Melissa officinalis* L. could be partially changed by supplementation of different elicitors.

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**EFFECT OF ESSENTIAL OIL OF *THYMUS DEANENSIS* CLELAK,
SATUREJA BACHTIARICA BUNG AND *ZIZIPHORA CLINOPODIOIDES*
LAM ON HEMATOLOGICAL PARAMETERS IN RATS**

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To evaluate the effects of oral administration *Thymus deanensis* Clelak essential oils, *Satureja bachtiarica* Bung and *Ziziphora clinopodioides* Lam on blood parameters of rats, 32 adult male wistar rats with a mean weight of 215±15 g were randomly selected and divided into 8 groups (4 rat/group). To the each group with two doses of 200 and 400 mg/kg orally for 20 days during the experimental period were added to the diet rat. During this period, the animals had free access to food and water. Weight, feed intake and water intake were measured daily and weekly weight change. At the end of experiments using an immunogen, stimulating the immune system and blood samples were taken and factors such as serum albumin and lymphocyte percentage was calculated. The experimental result showed statistically significant difference on serum albumin in difference groups ($p < 0.05$). So that the maximum amount of blood serum albumin to the head belonged to the group receiving *Satureja bachtiarica* Bung essential oil dose of 200 mg (4.77±0.14 mg/kg). Lymphocytes percentage highest belong to a group receiving the dose of 400 mg/kg of essential oil *Thymus Deanensis* Clelak was a statistically significant difference was not significant ($p > 0.05$). Given that the liver is albumin synthesis, increased albumin synthesis can be proposed as a sign of improvement in the activity of liver calls [1, 2].

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**EFFECTS OF PLANT DENSITY ON YIELD, YIELD COMPONENTS OF
MEDICINAL PLANT CONEFLOWER (*ECHINACEA PURPPUREA*)**

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In order to study the effects of planting density on yield and yield components of Coneflower (*Echinacea purppurea*), an experiment was conducted in 2009 at the Research Farm of Hashemi Nejad Education Center in Khorasan Razawi province. The experiment was randomized complete block design with three treatments at planting densities (50 * 20, 50 * 35 and 50 * 50cm) and three replications. During the experiments, different characteristics including the percentage of plants establishment, number of leaves per plant, plant height, number of lateral shoots, number of lateral branches, number of buds, the number of opened flowers, and phenological stages were measured, and take note of all the data. The (SAS) software was used for statistical analysis and treatments were analyzed by Duncan's test. Results of analysis of variance showed that the effects of planting density on the factors of emergence percentage, establishment percentage, leaf length and shoot number was not significant, but on other factors such as plant height, stem height, number of lateral branches, number of buds and open flowers were considered statistically significant. The best yield was obtained when row plant spacing was 35 cm.

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**COMPARISON ON QUALITY AND QUANTITY OF ESSENTIAL OIL
SIX CULTIVATED *THYMUS* SPECIES AT BEFORE FLOWERING AND
FULL FLOWERING STAGES**

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The genus *Thymus* belongs to the Family of lamiaceae and consist over 215 different species throughout the world. Eighteen species grow naturally in IRAN of wich four species are endemic. Different species of *Thymus* are used in food, ealthy, cosmetic and medical industry. Then Cultivate of six species of *Thymus* including: *Thymus kotschyanus*, *T. fedchenkoi*, *T. lancifolius*, *T. pubescens*, *T. daenensis* and *T. migricus* in station of medicinal plants Research in Shahedieh Yazd in 2008, with the coordinates of longitude and latitude 55 31 49 northly, 21 15 54 east to height of 1210 meters above sea level. The aerial parts of plants were collected before and full flowering stages and then were dried in shadow and hydro-distilled for obtaining their essential oil. Analysis and identification of chemical composition of the oil were performed by GC and GC/MS. That determined the best time to harvest with regard to oil yield and oil production is flowering time. The highest amount of oil yield was related to Species *Thymus daenensis* (3.52%).the highest amount of oil production was related to Species *T. lancifolius* (20.88Kg/he).Maximum composition of essential oil at full flowering para- cymene ,1,8 cineol, gamma terpinene and carvacrol , respectively 11.19% ,12.14%,10.74 was related to *T. fedchenkoi* and highest of borneol 12.7% was related to *T. pubescens*, and highest of thymol 73.26% was related to *T. daenensis* and highest of number compound 25 was related to *T. pubescens* and *T. lancifolius*. The highest amount of oil yield (before flowering) 2.36% was related to *T. daenensis* and highest amount of oil production was related to Species *T. fedchekoi* 10.03 Kg/he and highest carvacrol, Thymol , Borneol , gamma Terpinene, Cineole and Para-cymene Respectively 62.7%,69.4%,14.41%,8.41%,8.48% and 11.94% were Realate to Respectively *T. kotschyanus*, *T. lancifolius*, *T. fedchenkoi* , *T. pubescens* , *T. migricus* and highest of number compound 25 was related to *T. fedchenkoi*. Generally with regard oil yield and oil production and highest amount of Thymol *T. daenensis* was selected as superior Species.

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**ECOLOGICAL INVESTIGATION OF 10 AROMATIC PLANT SPECIES
OF ASTERACEAE FAMILY IN YAZD PROVINCE**

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According to national project of “Identification and ecological investigation of Aromatic plants” collection and identification Asteraceae family aromatic plants in different regions of Yazd Province were done. Then the ecological parameters of different plantations such as pedology, latitude, altitude, direct slope, percentage of slope, annual precipitation and mean temperature, climate, dominant species, companion species and the best habitat with respect to abundance and density were recorded. The resulted showed out of 71 aromatic plant species of province 10 species belong to 4 genera related to Asteraceae family. The genera are *Artemisia* with 4 species, *Achillea* with 3 species, *Tanacetum* with 2 species and *Cichorium* with 1specie. Biological forms of the plant species include: Hemichryptophytes 60 %, Cryptophytes 10 %, Therophytes 10 % and Chamaephytes 20 %. The important life form is Hemichryptophytes. The most species of this family occurred in origins of heights and mountainous conditions.



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SURVEY ON PHENOLOGY AND AECLIMITIZATION SOME *THYMUS* SPECIES IN FIELD

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The genus *Thymus* belongs to the family of *lamiaceae* and consist over 215 different species through the world. eightee species grow naturally in Iran of which four species are endemic. Different species of *Thymus* are used in food, healthy, cosmetic and medical industry. This study had been performed form 2008-2011 in Yazd medicinal plants research institute to introduce the methods of cultivation, protecting gathering, compatibility and producing of some *Thymus* species. For this purpose seeds 72 accessions of different different species of *Thymus* obtained from the research institute of forests and rangelands were planted in jifypot and in green house. Seedling about 2/5 month later, when had in the 10-12 leaves seedling to plastic pot and one month later on the main floor and one meter intervals on the row and between rows were planted. Then phenology and establishment of species with climatic conditions of Yazd medicinal plants research station were investigated in addition yield , per hectare and percentage of oil exact measurements were recorded.

The results showed that 16 accessions (22%) out of 72 accessions cultivated were compatible with climatic conditions in the station, 21 accessions (29%) were relatively compatible and 35 accessions (49%) were lower compatible.

The average of establishment 22.5, 20.5 and 17.4 respectively were in years 2009, 2010 and 2011. The greater of establishments MKOAW(*Thymus transcaspicus*) with 38 plants and lowest stablishment with 2 plants was related to MKOZSE (*T. Pubescens*).

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**THE EFFECT OF SALINITY ON SEED GERMINATION AND EARLY
SEEDLING GROWTH *SATUREGA BACHTIARICA***

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The *Satureja bachtiaria* is a perennial wild and medicinal plant that belongs to Lamiaceae family. This plant distribution to wild in some of part in Iran. This study was conducted to evaluate salt tolerance in *Satureja bachtiarica* at germination. Salinity levels including 0, 25, 50, 75, 100, 125, 150, 175 and 200mm applied using randomized completely block with three replication in the laboratory. Each experimented unit was one petridish with 11cm diameter and 25 seed. 6ml from each solution, added to petridishes. Germination percentage and rate were measured in the petridishes, radicle and plumule lengths were recorded at seedling stage. The results showed, increasing salinity caused a significant ($P<1\%$) reduction percentage and rate germination and radicle and plumule lengths. The highest percentage and rate germination and radicle and plumule lengths obtained with control and lowest with salinity level 200mm (NaCl).

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**SURVEY ON QUALITY AND QUANTITY OF ESSENTIAL OIL
CULTIVATED ACCESSIONS OF *THYMUS LANCIFOLIUS* IN
PROVINCE YAZD**

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The genus *Thymus* belonging to the family of *lamiaceae* and consist over 215 different species throughout the world. Fourteen species grow naturally in Iran of which four species are endemic. Then cultivate of 11 accessions *Thymus lancifolius* in station of medicinal plants research in shahedieh Yazd. The aerial parts of plants were collected 50% flowering stage and then were dried in shadow and hydro – distilled for obtaining their essential oil. Analysis and identification of chemical composition of the oil were performed by GC and GC/MS. The highest amount of oil yield respectively were related to accessions ZSELP (4%), MKOBHU (2.91%), QAW (2.55%) and lowest was related to accession CFTAW (1.22%). The highest amount of oil production respectively were related to accessions ZSELP (36.35kg/he), QAW (34.82kg/he) , MKOBHU (31kg/he) and lowest was related to AWBHU (10.6kg/he). Survey taken shows of the 11 samples of oil obtained in maximum composition of essential oil paracymenthen, 1-8 cineol, gamma-terpinene, borneol, thymol, carvacrol, geraniol, limonene, linalool and E-caryophyllene respectively MKOBHU (11.7%), CFTAW (17.63%), QNJI (8.94%), QLP (5.5%), AWMKO (68.3%), QZSE (60.2%), QCFT (73.7%), XDRNJI (21.48%), ZSELP (81.4%) and AWBHU (5.66%). Generally, with regard to oil yield, oil production and main composition of essential oil accessions ZSELP with 4 percent and rate of oil production 36.35kg/hectare and 81.4 percent linalool and accession MKOBHU with 2.91% and the rate oil 31 kg/hectare and percent 61.34 percent thymol and accession QAW with 2.55% essential oil and the rate of oil production 34.82 kg/hectare and percent 20.49 thymol were selected as superior accessions.



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**SURVEY ON QUALITY AND QUANTITY OF ESSENTIAL OIL
CULTIVATED ACCESSIONS OF *THYMUS*
KOTSCHYANUS IN PROVINCE YAZD**

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The genus *Thymus* belonging to the family of *lamiaceae* and consist over 215 different species throughout the world. Fourteen species grow naturally in IRAN of which four species are endemic. Different species of thymus are used in food, Healthy, cosmetic and medical industry. Then cultivate of 20 accessions *Thymus kotschyanus* in station of medicinal plants research in shahedieh YAZD. The aerial parts of plants were collected 50% flowering stage and then were dried in shadow and hydro – distilled for obtaining their essential oil. Analysis and identification of chemical composition of the oil were performed by GC and GC/MS. The highest amount of oil yield respectively were related to accessions CFTBHU (3.42%), VGYBHU (3.22%), QXDR (2.66%) and lowest was related to accession BHUQ (0.79%). The highest amount of oil production respectively were related to accessions BHUMKO (38.3kg/he), CFTBHU (36.37kg/he), VGYBHU (36.1kg/he) and lowest was related to AWLP (1.3kg/he). Survey taken shows of the 20 samples of oil obtained in maximum composition of essential oil paracymen ,1,8 cineol , gamma-terpinene, borneol, thymol, carvacrol, linalool and E-caryophyllene respectively GYCFT (28.48%), ZSEMKO (25.16%), ZSEMKO (11.94%), CFTBHU (7.68%) ,ZSEBHU (60.04%), CFTBHU (63.81%), VGYBHU (45.57%)and ZSEBHU (2.52%).Generally, with regard to oil yield, oil production and main composition of essential oil accessions CFTBHU with 3.42 percent and rate of oil production 36.37 kg/hectare and 63.81 percent carvacrol and accession VGYBHU with 3.22% and the rate oil 36.1kg/hectare and percent 45.57 percent linalool and accession BHUMKO with 2.4% essential oil and the rate of oil production 38.3 kg/hectare and percent 11.94 Gamma-terpinene were selected as superior accessions.



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OPTIMIZING THE PRODUCTION OF ROSE OIL (AN IRANIAN TRADITIONAL DRUG) ACCORDING TO PHYTOCHEMICAL FACTORS

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Rose oil (*Rowghan-e Gul*) is an Iranian traditional drug used both topical and systemic in gastritis, inflammatory bowel disease, headache, and haemorrhoid [1, 2]. Traditional manuscripts have reported two different methods of preparation for this medicine; the first is macerating rose petals in sesame oil for 25 days under sunlight (sample 1); and the second is extracting rose petals by squeezing and then boiling the mixture of the extract with sesame oil to evaporate aqueous part (sample 2) [3]. The first method is more preferable in traditional medicine but because of the simplicity of second method, it is more suitable for industrializing. To find the pros and cons of these two methods, total phenolics, total essence (based on citronellol), TLC profile of the constituents, and oil rancidity indices i.e. acid and peroxide values were determined. The results showed that sample 1 had greater amounts of total phenolics (0.05% Vs 0.01%). It also contained 15.5 times more essences than sample 2. TLC profiles showed that sample 1 had one more spots ($R_f = 0.04$) representing flavonoids (according to NP indicator). About oil rancidity indices, both samples were in standard ranges but all indices of sample 1 were greater than sample 2. It could be due to long exposure of sample 1 to sunlight.

According to the results, sample 1 had more amounts of flavonoids and essential oils. These compounds are considered as therapeutic agents of rose oil. Therefore, sample 1 is more preferable than sample 2. Appropriate antioxidants should be utilised to protect sample 1 against sunlight oxidation.



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**DETERMINATION OF LETHAL COCENTRATION (LC 96H) OF
HYDROALCOHOLIC EXTRACTS OF *ZATARIA MULTIFLORA* AND
ALLIUM SATIVUM IN PERSIAN STURGEON (*ACIPENSER PERSICUS*)
FINGERLINGS AND THEIR EFFECTS ON GILL TISSUE**

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Today, the importance of using herbal drugs for campaigning against infectious and non infectious diseases is obviously confirmed and it is necessary that these drugs be replaced with chemical drugs in aquaculture industry. This study carried out to determine (LC 96h) for hydro alcoholic extracts of *Zataria multiflora* and *Allium sativum* in Persian sturgeon (*Acipenser persicus*) fingerlings for future application studies. The research performed on Persian sturgeon fingerlings having 3.22 ± 0.51 g weight in static environment. In order to study the effects of these extracts, 240 fingerlings selected (for each extract) in 7 treatments and one control group (3 replications for each treatment) were used and totally 54 tanks having 30 liter volume applied. During the experiment the temperature in tanks containing *Zataria multiflora* and *Allium sativum* was 23.3 ± 0.26^{0c} and 23.1 ± 0.25^{0c} , dissolved oxygen was 8.72 ± 0.34 mg/l and 8.92 ± 0.31 mg/l and pH was 7.77 ± 0.17 and 7.71 ± 0.16 , respectively. In this study, the rate of nitrite, nitrate, ammonium, electric conductivity and water hardness measured in different treatments. This experiment conducted according to O.E.C.D method during 96h [1]. In this survey according to Probit analysis, LC₁₀, LC₅₀ and LC₉₀ for hydro alcoholic extract of *Zataria multiflora* was 431.12, 766.65 and 1363.64 mg/l, also LC₁₀, LC₅₀ and LC₉₀ for hydro alcoholic extract of *Allium sativum* was 909.91, 1279.97, 1800.52 mg/l, respectively [2]. The results showed that the mortality of sturgeon fingerlings occurred at lower concentration of hydro alcoholic extract of *Zataria multiflora* compared to hydro alcoholic extract of *Allium sativum*. So, it should be considered in determining suitable therapeutic concentrations of these extracts for combating pathogenic factors. The results of microscopic examination of gill tissue in the different treatments of hydro alcoholic extracts of *Zataria multiflora* and *Allium sativum*, indicating the presence of lesions such as congestion, hyperplasia, elongation of the secondary lamella, the bulk of the cartilage supporting the gill filaments, necrosis and adhesion of secondary lamella to each other.

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**STUDY OF THE EFFECT OF HYDROALCOHOLIC EXTRACT OF
WALNUT LEAVES ON BLOOD FACTOR CHANGES OF LDL, HDL,
TRIGLY CERIDE AND FULL CHOLESTEROL IN FEMALE
HYPERCHOLESTOLEMIC RABBITS**

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walnut leaves contain phenol composition which reduce cardiovascular diseases, prevent oxidation of LDL in cells, prevent different types of cancers and stop creation of mutation as well as oxidation activity of lipids, therefore. The most important goal of the present paper is the study of the effect of the walnut leaf extract on blood factors and atherosclerosis in mature rabbits. 30 mature female rabbits were prepared, and were divided into 6 groups of 5 rabbits. These groups were fed as follows: group 1 with normal diet, group 2 with corn oil (cholesterol solvent), group 3 with high cholesterol diet, group 4 with high cholesterol along with minimum dose of walnut leaf extract (100 milligram per kilogram), group 5 with high cholesterol diet along with a mean dose of walnut leaf extract (200 milligram per kilogram) and group 6 with a high cholesterol diet along with a maximum dose of walnut leaf extract (400 milligram per kilogram). These diets were given during a period of 60 days through gavage. Then after anaesthesia, blood samples were taken directly from their hearts, and the studies regarding the changes of blood factors were performed. Statistical data was then determined through ANOVA test (one-way analysis of variance) at the significance level ($p < 0.05$) by SPSS software, version 18.

Results obtained from the current study show that in group 3 (high cholesterol diet), the value of full cholesterol, triglyceride and LDL have a significant increase compared to those in group 1 (normal diet). The thickness of HDL serum in experimental groups of 4, 5 and 6 showed a significant increase compared to those in the control group ($p < 0.05$). Also, the thickness of HDL in the experimental group 6 shows a significant increase compared to that of the experimental groups of 4 and 5 while other measured factors did not show an important change compared to the control group. Based on the obtained results, the extract of walnut leaf can be considered as an effective factor in curing atherosclerosis illnesses in hypercholesterolemic rabbits and this effect is dependent on doses.

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**EFFECT OF DIFFERENT BIOFERTILIZERS ON SOME
PHYSIOLOGICAL OF THREE ECOTYPES OF HEMP UNDER SALINE
SOILS AND SALINE WATERS**

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In order to evaluate the effect of different biofertilizers on some physiological trait of three hemp ecotypes a field study was carried out in North East of Esfahan in 2012 season. The experimental design set as factorial based on randomized complete block design with three replicates. Treatments including of three hemp ecotype (Shiraz, Mashhad and Esfahan) and biofertilizers (Supernitroplus, Biosulfure, Nitroxin, Mycorrhiza species of *Glomus mosseae* and control). The pH and EC of applied water were 8.25 and 12250 $\mu\text{dS/cm}$ and the pH, EC of soil were 8.67 and 210.5 $\mu\text{dS/cm}$ respectively. Results showed crop growth rate (CGR), plant height and leaf area index (LAI) had significant difference between treatments. The plant height was lower under control treatment whereas plant height had not any difference between biofertilizer treatments. Hemp Shiraz ecotype showed highest crop growth rate whereas Mashhad and Esfahan ecotypes had lowest crop growth rate. The amount of crop growth rate was higher under Mycorrhiza, Nitroxin treatments and the lowest CGR was obtained from control, Supernitroplus and Biosulfure treatments. The results showed the highest leaf area index was belonging to Supernitroplus treatment. After that the lowest LAI was obtained to Nitroxin, Biosulfure and Mycorrhiza treatments.



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EVALUATION THE RESPONSE OF INOCULATION BLACK CUMIN SEED (*NIGELLA SATIVA* L.) WITH AZOSPIRILLUM AND AZOTOBACTER

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Bacterial and fungal micro-organisms, especially plant growth bacteria and substances resulting from the activities are considered the most important Bio-fertilizers. Azospirillum and Azotobacter bacteria increases plant growth and yield with fixing Nitrogen and producing plant hormones such as Auxins, Gibberellin and Cytokinin. To investigate the effect of Azospirillum and Azotobacter on morphological traits of Black cumin (*Nigella Sativa* L.), a field experiment was conducted at the Research Institute of Forests and Rangelands - Alborz Research Station in the spring of 2011. The experimental design was randomized complete block with three replications and four treatments (control, inoculation with Azotobacter, inoculation with Azospirillum and inoculation with Azotobacter + Azospirillum). The results indicated that the inoculation of black cumin seeds with biological fertilizers caused significant differences in plant yield, seed yield, thousand grain weights and amount of active substances Thymoquinone and Carvone. Mean comparison of treatments showed that the highest plant yield (3886.7 kg/ha) and seed yield (445.69 kg/ha) were caused by Azospirillum inoculation, and also the highest thousand grain weights (2.522 g), amounts of active substances Thymoquinone (0.821 molar) and Carvone (0.879 molar) were caused by Azotobacter + Azospirillum treatment. So the application of appropriate biological fertilizers can be effective on black cumin yield [1-4].

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**EFFECT OF SPRAYING AMINO ACID ON THYMOQUINONE,
CARVONE AND YIELD OF BLACK CUMIN (*NIGELLA SATIVA* L.)**

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Organic compounds containing nitrogen with low weight, especially amino acids are structural components in synthesis reactions of plants. The amount of nitrogen in plant, have a significant effect on Leaf development, because the main role of nitrogen is cell reproduction, cell differentiation and cell elongation. As the result, a medicinal plant yield will be optimized and cost effective when the plant is in appropriate conditions. In order to assess the response of the black cumin (*Nigella Sativa* L.) to amino acid spraying, a field experiment was conducted at the Research Institute of Forests and Rangelands – Alborz Research station, Karaj, in 2011. This experiment was conducted in the form of a randomized complete block design with three replications and four treatments (A₁: without spray of amino acid (control), A₂: spray of amino acid is start of stem elongation, A₃: spray of amino acid in start of flowering, A₄: spray of amino acid stem elongation + flowering). The results showed that spraying amino acid on black cumin caused significant differences in amount of active substances Thymoquinone and Carvone, but there wasn't significant difference in plant yield, seed yield and thousand grain weights. Mean comparison of treatments showed the highest amounts of active substances Thymoquinone (0.867 molar) and Carvone (0.935 molar) were caused by A₄, the highest seed yield (384.66 kg/ha) and thousand grain weights (2.487 g) were obtained in A₂ and the highest plant yield (2916.7 kg/ha) was achieved in A₁ [1- 3].

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**THE EFFECT OF SALINITY STRESS ON GERMINATION AND
PLANTLET GROWTH OF SAFFLOWER MEDICINAL PLANTS
GENOTYPES**

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Safflower (*Carthamus tinctorius* L.) is annual plant of the composite family (Asteraceae). It has cathartic properties. Use of safflower oil in foods decreases cholesterol. In order to investigation of salinity stress effects on germination, vegetative, some germination indices and plantlet growth an experiment conducted by factorial based on randomized completely block designs with 4 replications in 2011 in department of agriculture of Urmia Payame Noor. The factors were 4 genotypes (Zarghan 279, Gholdasht, Faraman and Padideh) and 5 level of salinity (0-4-8-12-16) ds/m from NaCl. The results showed that different levels of salinity had significantly effects on germination percent, root dry weight, seedling dry weight, germination rate, germination uniformity, stem length, stress tolerance index, root length. In stage of plantlet growth traits of root dry weight, leaf dry weight, stem dry weight, plantlet dry weight, stem length, root length and stress tolerance index measured. The results of two stages showed that with increasing salinity stress all of traits decreased so the highest obtained from control treatment and the lowest obtained from salinity level of 16 ds/m. The genotypes respond differently to salinity levels. Genotypes of Zarghan 279, Gholdasht and Padideh were sensitive to salinity stress. It seems genotypes of Faraman have more tolerance to salinity conditions [1-3].

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**INHIBITORY EFFECT OF MEDICINAL PLANT AQUEOUS AND
ETHANOLIC EXTRACTS ON *ALTERNARIA SOLANI* MYCELIAL
GROWTH**

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Nowadays, using biological potent agents such as plant metabolites has been increased for plant diseases control because of problems caused by increasing application of chemical pesticides in agricultural systems [1]. This study performed with a proposal investigating antifungal effect of plant extracts on *Alternaria solani*. Therefore, crude extracts of 11 different medicinal plant species, *Thymus sp.*, *Foeniculum vulgare*, *Pimpinella anisum*, *Allium ampeloprasum*, *Adiantum capillus-veneris*, *Viola odorata*, *Papaver sp.*, *Rosa hybrida*, *Malva sylvestris*, *Artemisia dracuncululus*, *Matricaria recutita* were obtained using two solvents; ethanol and water. The inhibitory effect of these extracts was examined against *A. solani* via paper disc method (5 mg per paper disc). Results showed that the most inhibition on *A. solani* were belonging to aqueous extract of *Papaver sp.* and *Allium ampeloprasum* with 10.22 ± 0.22 and 10 ± 0.39 mm inhibition, respectively. Therefore, antimicrobial effect of medicinal plants could help to minimize application chemical pesticides [2].

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**SOLVENT EFFECTS ON EXTRACTION AND DETERMINATION OF
THE ISOFLAVONE DAIDZEIN IN SOYBEAN AND ITS EXTRACTS BY
HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY**

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Soybean (*Glycine max* L.) and their derivatives are a well-known source of isoflavones. Isoflavones are a group of heterocyclic phenols also known as phytoestrogens which have been credited to perform several functions in health promotion. These substances have been widely used for their estrogenic activity and potential in the prevention of some chronic diseases, including hormone-related cancers, osteoporosis and cardiovascular diseases. The major isoflavones present in soy are in glycoside forms of daidzin, genistin, glycitin, and its aglycones forms daidzein, genistein and glycitein, respectively. In this study, several solvents were used for the extraction efficiency of isoflavonol daidzein from soybean seed samples. The respective extracts were subjected to quantification of the daidzein by high-performance liquid chromatography (HPLC) with photodiode array (PDA) detector. Optimum extraction and hydrolysis for daidzein recovery from soybean seeds was 80% ethanol containing 1 M HCL. The daidzein ranged from 1.2 to 1.8 mg per gram in seed samples.

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THE STUDY OF ANTIOXIDANT AND ANTIRADICAL CAPACITY OF PHENOLIC COMPOUNDS OF METHANOLIC AND ETHANOLIC EXTRACTS OF PLUM (*PRUNUS DOMESTICA* L.): IN BOTH FRESH AND DRIED SAMPLES

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Consumption of fruits, like plums and prunes, is useful in blood circulation problems, measles, and digestive problems in prevention of cancer, diabetes and obesity [1]. The objective of this study was to evaluate of antioxidant and antiradical capacity of methanolic and ethanolic extracts of plum (*Prunus domestica* L.) in both fresh and dried samples. Plums were collected from the Sadaghyan village of Salmas located West Azarbaijan Province. Amount of the plums were dried in the sun for 20 days (daily average temperature was 33°C). The experiments were carried out to measure the total phenolic and flavonoid content, reducing power assay, thiobarbituric acid (TBA) test, superoxide and hydrogen peroxide radical inhibition. The results showed that the highest values in the first four parameters were related to the methanolic extract of dried sample which showed statistically significant differences ($p < 0.5$), while contradictory results were found for superoxide and hydrogen peroxide radicals inhibition percentage as the maximum values were related to the methanolic extract of fresh sample. Moreover the results demonstrate that the total phenolic content of methanolic extract in both fresh and dried samples of plum significantly higher than the ethanolic extract. The results of correlation analyses among the all parameters which the total phenolic content and TBA test had a strong correlation ($r^2=0.978$) which showed significant differences ($p < 0.01$). The present study demonstrates that the dried sample in comparison with fresh sample contain high levels of total phenolic and flavonoid contents which enhances antioxidative activities in their but dried sample is less successful than fresh sample in collection of oxygen radicals. In conclusion simultaneous use of both types of samples can lead to effective antioxidant and antiradical capacity.

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HOWTHORN BERRIES HYDROALCOHOLIC EXTRACT WITH HIGH TRITERPENIC ACID CONTENT REDUCES THE EXPERIMENTALLY-INDUCED COLITIS DAMAGES IN RAT

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Ulcerative colitis (UC) is a chronic inflammatory disease of gastrointestinal tract, which is characterized by clinical symptoms of diarrhea, rectal bleeding, body weight loss, and abdominal pain [1]. Previous studies have demonstrated that hawthorn berry extracts contain various constituents with remarkable biological activities such as free radical scavenging, anti-lipoperoxidation and anti-inflammatory. This study carried out to investigate the protective effect of Hawthorn berries hydroalcoholic Extract (HBE) on acetic acid (AA)-induced colitis in rats. The triterpenic acids content of hawthorn berry extract was analyzed using reversed-phase high performance liquid chromatography (HPLC) according to previously described method [2]. Thirty adult Wistar rats assigned into 5 groups including control and test groups (n=6). The control animals received saline normal and the test animals pretreated with saline normal (Sham group), mesalamine (M, 50 mg/kg), HBE (H, 100 mg/kg), and mesalamine and HBE (HM) 3 days before colitis induction. Colitis was induced by administration of 1 ml acetic acid (4%) via polyethylene catheter intra-rectally in all test groups. The treatment regimens were continued for one week after colitis induction. All test compounds were administered through the gastric gavage. HPLC analyses of hawthorn berry extract showed that 0.13% and 0.5 % of the total content of extract belong to OA and UA, respectively. The body weight gain, myeloperoxidase activity, antioxidant status and histopathological examinations were performed to evaluate the protective effect of test compounds. Acetic acid administration resulted in a significant ($P<0.05$) body weight loss, while all test substances could significantly ($p<0.05$) recover the AA-decreased body weight gain. The reduced total thiol molecules level and elevated lipid peroxidation concentration were normalized by the test compounds both in individual and in combination forms. The histopathological studies revealed that HBE could reduce the AA-induced inflammatory signs of edema, infiltration of neutrophils, and necrosis. Our data suggest that the AA-induced colitis is protectable with HBE. Moreover, the protective effect of HBE in comparison to reference compound of mesalamine in individual but not in the combination form also is concluded. The histopathological protective effect of HBE may attribute to its antioxidant property.

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**IN VITRO ESTABLISHMENT AND CONTROL OF BROWNING IN
SEEDLESS *BERBERIS VULGARIS***

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Berberis vulgaris.var.*asperma* (berberidaceae family) is one of the valuable medicinal plants with valuable alkaloids such as berberine, berbamine and oxyacanthine. Vegetative propagation of this plant only should be by sucker which is very difficult because in this way the roots were damaged and establishment is so hard. It seems that micropropagation is more appropriate for produce more seedling and culture development of *Berberis vulgaris* var *asperma*. In this experiment different concentration of hypochlorite sodium (1,2 and 4 percentages) were used for 10 minutes duration. For surface disinfection of shoots, the most suitable concentration of hypochlorite sodium was 1% for 10 minutes. In order to control phenol, polyvinylpyrrolidone (0/5 g/lit), citric acid and ascorbic acid in two methods, plunging (50 mg/lit) and add to the nutrient medium (150mg/lit) was used. The most suitable compound was polyvinylpyrrolidone and the best growth was in the control medium without use of antioxidant compound [1, 2].

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**EFFECT OF DIFFERENT NURSERY BED ON LAVANDULA'S
MARCOTTING**

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Lavandula (*Lavandula officinali*) as an ornamental herb has been planted in recent years in parks and gardens. The plant is reproduce either sexual or vegetative reproduction by seed, but requires a long time. Also propagation by cuttings grows slowly, especially some of the types marcotting hardly. Therefore it is useful to study the conditions that precipitate marcotting.[1] In order to show that, it was done a completely randomized design experiment with 4 treatments and 3 replications in a cold frame in the Research Department (Jahad-e-Daneshgahi), Kermanshah in 1390. Experimental treatments of different beds were consisted of (vermicompost, manure, fine gravel and filed soil).Leaf cuttings of length 23 cm was taken of clone in November. Results showed that different bed had significant effect on marcottings of Lavandula. In comparison between different treatments, it was observed that Lavandula cuttings in fine gravel has the highest percentage in marcotting (%70.67) which has no significant difference with in soil (%62) but very different with other treatments. Manure and vermicompost's effect on marcooting of Lavandula were not significantly different. Very poor marcooting in vermicompost and manure were observed, 20% and 16% respectively. According to this result vermicompost and manure are not suitable for vegetative propagation of Lavandula.

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**THE EFFECTS OF ALLIUM HIRTIFOLIUM BOISS. ON
CARDIOVASCULAR RISK FACTORS IN
HYPERCHOLESTEROLEMIC RABBIT**

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Hypercholesterolemia may enhance haemostatic factors which are considered as cardiovascular risk factors. This study was, therefore, aimed to evaluate the effects of *Allium hirtifolium* Boiss on fibrinogen and factor 7 in hypercholesterolemic rabbits. In an experimental study, 24 New Zealand rabbits were randomly designated into 3 groups of 8 and were fed for 60 days as follows: normal diet, hypercholesterol (1%) diet, hypercholesterol (1%) diet+ *Allium hirtifolium*. At the beginning and 60 days after the start of the study, the blood fibrinogen and factor 7 were measured and compared in different groups.

There was no difference for fibrinogen and factor 7 in different groups at the start of the study, however, the blood fibrinogen and factor 7 were increased in hypercholesterolemic group compared to normal diet group ($P < 0.05$). The amount of blood fibrinogen and factor 7 were decreased in hypercholesterol + *Allium hirtifolium* Boiss group compared to hypercholesterol diet group ($P < 0.05$). *Allium Hirtifolium* Boiss may have beneficial effect on heart by decreasing blood fibrinogen and factor 7 as cardiovascular risk factors.



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COMPARING VARIOUS METHODS OF SEED AND EMBRYO
CULTURE AND CHARCOAL EFFECT IN
OPTIMIZING *IN VITRO* CULTURE OF *FERULA ASSA-FOETIDA*

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Ferula assa-foetida L. is an endangered plant species of the family Apiaceae and endemic to Iran whose mass production is exposed to serious problems due to being monocarpic and prolonged seed dormancy. The first step to improve this precious medicinal, industrial and economic plant is ability in production of numerous sterile plantlets in order to prepare appropriate potent explants. In this survey, *in vitro* culture of *Ferula assa-foetida* L. was performed by a factorial trial in the form of completely random design including A factor in 3 levels (including MS 1/4, MS 1/2, MS medium) B factor in 2 levels (embryo culture horizontally; and vertically so that half part of the embryo is inside the medium and cotyledons stand upward) and C in 5 levels (containing 0, 0.6, 0.9, 1.2, 1.5 g/L char-coal) in 3 repeats. Several growth traits were measured during 4 weeks. Seed culture was also studied in 4 medium including perlite, distilled water, solid MS 1/4, soil and moist filter paper. The results were indicated that plants growth was better in solid MS and perlite. Embryo culture ways were resulted in vigorous and numerous plantlets in shorter time, in comparison with seed germination ways. Finally the best option was vertically culture of embryo in MS 1/4 medium containing 0.5 g/L char-coal. Obviously this method will provide the plant with a very similar condition to growth in natural environment.

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COMPARATIV POLLEN MORPHOLOY OF THE GENERA *ALLIUM*
AND *CALOCHORTUS* OF ORDER LILIALES

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These two genera of pollen grains collected from different herbariums and nature also was studied with light and electron microscopy. All single type of pollen grain that pollen gully continues until the end of the track, single, oval-shaped, with a perforated trim level Agzyn-rippled or wavy-has holes. Wall thickness and diameter of the holes in the mesh network of networks in *calochortus* is most of the other genus, Although are *Allium* genus under Alliaceae family and *calochartus* genus under the liliaceae family but in terms of the morphology of the pollen grains are very similar and their differences are minor. These genera in compared to the other genera of Svsnyan family, in term of morphology of pollen grains, are similar to some of *Tulipa* and *fritillaria* species of subfamily lylvydh.

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**THE EFFECT OF SALINITY STRESS ON SEED GERMINATION AND
SEEDLING GROWTH IN DESERT ROD
(*EREMOSTACHYS LACINIATA* (L.) BUNGE)**

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Germination is an important growth plant stage that often affect by environmental stress including salinity stress. The main objective in this study was to determine germination factors and seedling growth of desert rod (*Eremostachys laciniata* (L.) Bunge) under salinity stress. So, an experiment was carried out using a completely in randomized design with three replications. Salinity levels included 0 (control), 25, 50, 75, 100, 125 and 150 mM NaCl. The effect of various salinity levels on germination percentage, germination rate, radicle length, plumule length and fresh weight of seedling was significant at 1%. This effect on dry weight of seedling was significant at 5%. All of germination and seedling growth factors had the highest and lowest rates at control and 150 mM NaCl. According to comparing of means we can conclude that this desert rod is tolerant to salinity stress up to 125 mM NaCl; although decreasing of salinity levels can increase germination factors and seedling growth of this medicinal plant.

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THE ANTIBACTERIAL EFFECT OF THE TOTAL METHANOL EXTRACT OF THE PETAL AND STAMEN OF SAFFRON FLOWERS (*CROCUS SATIVUS*) AGAINST FIVE BACTERIAL FOOD BORNE STRAINS

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Several studies demonstrated the antimicrobial effects of red stigmas of saffron flowers [1, 2] but because of the high expense of the stigma the use of this part of the plant as antimicrobial agent is not economical. Therefore, in this study the antibacterial activity of the total methanol extract of the petals and stamens of Saffron flowers against five foods borne strains were evaluated.

The petals and stamens methanol extracts were prepared by maceration. Primary antibacterial effect of extracts against *Staphylococcus aureus* (PTCC-1431), *Bacillus cereus* (PTCC-1247), *Escherichia coli* (PTCC-1399), *Shigella dysantriae* (PTCC-1188), *Salmonella typhi* (PTCC-1639) were evaluated by cup-plate method and then MIC and MBC value were determined by broth macro-dilution method according to CLSI. The determined MIC of stamens extract against *S. aureus*, *B. cereus*, *E. coli*, *S. dysantriae*, *S. typhi*, were 125, 62.5, 125, 31.25, 125 mg ml⁻¹ respectively and the MBC were 250, 250, 250, 125, 250 mg ml⁻¹. The MIC of petals extract against *S. aureus*, *B. cereus*, *E. coli*, *S. dysantriae*, *S. typhi*, were 62.5, 250, 125, 62.5, 62.5 mg ml⁻¹ respectively and the MBC were 500, 500, 250, 250, 125 mg ml⁻¹ respectively. Results of both "cup-plate" and "broth macro-dilution" methods demonstrated that methanol extracts of petals and stamens of Saffron flowers (*Crocus sativus*) can inhibit growth of every five food borne bacteria.

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**ALLELOPATHY EFFECTS OF LAVENDER, ABSINTHIUM AND
WALNUT ON GERMINATION AND GROWTH OF *CONVOLVULUS
ARVENSIS*, *PORTULACA OLERACEA* AND *TRITICUM AESTIVUM***

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One means of reducing herbicides utilization is allelopathy effects that is found in some plant species. Therefore, allelopathy effects of different doses (0, 5, 7.5 and 9 gr/pot dried leaves) of Walnuts, Lavender and Absinthium on germination and growth of *Convolvulus arvensis*, *Portulaca Oleracea* and *Triticum aestivum* were evaluated in greenhouse conditions. This experiment was conducted base on factorial design with 3 replications. The above amounts of allelopat plants were mixed with 2 kg soil in each pot. Shoot dry weight, shoot fresh weight, root dry weight, root fresh weight, seedling length, leaf number and germination percentage were evaluated. Results showed that main effect of allelopathy on shoot fresh and dry weight, root dry weight, seedling length was significant ($p < 0.05$). In all evaluated parameters, Lavender had reducing effect more than Walnuts and Absinthium. Dose had significant effect on all characteristics and upper doses (7.5 and 9 gr/pot) were more effective. In general, results showed that all plants reduced shoot fresh weight of *Portulaca Oleracea* significantly ($p < 0.05$) and 9 gr/pot of Walnuts and Absinthium had significant reduction effect on Lavender germination. Allelopat plants had no significant effect on *Convolvulus arvensis*. All plants had significant effect on shoot fresh and dry weight, root fresh and dry weight and seedling length and had no significant effect on germination of *Triticum aestivum*.

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**PROTECTIVE EFFECTS OF *OCIMUM BASILICUM* L. (BASIL) ON
ELECTROCARDIOGRAM, CARDIAC FUNCTION AND
HISTOPATHOLOGY IN ISOPROTERENOL INDUCED MYOCARDIAL
INFARCTION IN RATS**

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The objectives of the present study were phytochemical screening and study of the effects of ethanolic extract of aerial parts of *Ocimum basilicum* (basil) on cardiac functions and histopathological changes in isoproterenol-induced myocardial infarction (MI). The leaves of the plant were extracted with ethanol by maceration and subjected to colorimetry to determine flavonoids and phenolic compounds. High-performance TLC analysis and subsequent CAMAG's TLC scanning were performed to quantify rosmarinic acid content. Wistar rats were assigned to 6 groups of normal control, sham, isoproterenol, and treatment with 10, 20, and 40 mg/kg of the extract two times per day concurrent with MI induction. A subcutaneous injection of isoproterenol (100 mg/kg/day) for 2 consecutive days was used to induce MI. Phytochemical screening indicated the presence of phenolic compounds (5.36%) and flavonoids (1.86%). Rosmarinic acid was the principal phenolic compound with a 15.74% existence. The ST-segment elevation induced by isoproterenol was significantly suppressed by all doses of the extract. A severe myocardial necrosis and fibrosis with a sharp reduction in left ventricular contractility and a marked increase in left ventricular end-diastolic pressure were seen in the isoproterenol group, all of which were significantly improved by the extract treatment. In addition to in-vitro antioxidant activity, the extract significantly suppressed the elevation of malondialdehyde levels both in the serum and the myocardium. The results of the study demonstrate that *Ocimum basilicum* strongly protected the myocardium against isoproterenol-induced infarction and suggest that the cardioprotective effects could be related to antioxidative activities [1,2].

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**STUDY OF THE MEDICINAL PLANTS BIODIVERSITY SPECIES OF
DASHTESTAN COUNTY IN BUSHEHR PROVINCE**

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Medicinal plants are the “backbone” of traditional medicine, which means more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis [1]. There are nearly 2000 ethnic groups in the world, and almost every group has its own traditional medical knowledge and experiences [2]. Dashtestan, with an area of about 6371 km², is situated at 85 km in the east of Bushehr city (The center of Bushehr province, Iran). This area is important for plant biodiversity, due to the presence of some important habitats such as pass two rivers of dalaki and shapoor, also of this area are surrounded by mountains of Zagros Range. Perpose of in this work identity and biodiversity of medicinal plants species of this region. Therefore for the old antiquity on this city and high biodiversity on plant species, in this work the medicinal vascular plants of this region were collected, identified and studied for medicinal usages. For this purpose, many specimens were collected during the vegetative seasons in 2010 till 2012. All the specimens were prepared as standard herbarium sheets, identified by using available references and stored in the herbaria of Research Institute of Forests and Rangelands (TARI) and Payam Noor University.

As a result, 97 species belonging to 81 genera and 41 families of were reported from the rangelands around the Dashtestan. Asteraceae with 10 species, and Lamiaceae with 8 species were the largest families respectively, and *Ziziphus* (Rhamnaceae) with 6 species was the largest genus in the ethnobotanical medicinal plants of this area. Local medicinal usages of these plants were also reported.

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**DETERMINATION OF TOTAL PHENOLIC CONTENT IN TWO
EXTRACTS FROM CRUCIFEROUS PLANTS AND ITS CORRELATION
WITH THEIR ANTIOXIDANT CAPACITIES**

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Phenolic compounds inclusively exist in plants are categorized as natural antioxidants and attracted increasing attention due to their dominant impact on preventing and treating many oxidative stress-related diseases [1]. Our before and preliminary in vitro studies which were focused on two extracts of cruciferous plants namely; *Sameraria nummularia* and *Cardamine uliginosa* indicated that they have significant antioxidant capacities [2]. Therefore, this study was aimed to establish a correlation between total phenolics contents and antioxidant capacities in the extractives. Total phenol content of two alcoholic plant extracts were measured by employing a method described by Singleton and Rossi [3] and using Folin-Ciocalteu reagent and Gallic acid as a standard. Total phenolics were then quantified by drawing calibration curve from the known concentrations of gallic acid. Correlation analyses finally were made between total phenol concentration and antioxidant capacities. The results showed that the highest and the lowest total phenolics contents in *S. nummularia* extract (SNE) based on Gallic acid equivalent concentration (GAE/L) was found to be 1.01 ± 0.11 .and 66.64 ± 2.85 mg GAE/L while, for *C. uliginosa* extract (CUE) the least and the highest total phenol concentrations were determined to be 0.75 ± 0.28 and 99.24 ± 7.46 GAE/L, respectively. The Correlations obtained between total phenolic content and antioxidant capacities in SNE and CUE were as (R^2 of 1 and 0.99), respectively.

With regard to high correlation made between antioxidant capacities and total phenol amount in two plant extracts; it can be concluded; phenolic compound can be responsible as main components for antioxidant action in these two plant extracts.

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**STUDY OF THE PRIMARY ETHNOBOTANICAL OF GENAVEH
COUNTY IN BUSHEHR PROVINCE**

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Although ancient sages through trial and error methods have developed herbal medicines, the reported uses of plant species do not certify their efficacy [1]. There are nearly 2000 ethnic groups in the world, and almost every group has its own traditional medical knowledge and experiences [2]. Genaveh County, with an area of about 1837 km², is situated at north coast at Persian Gulf. This county of dry pedogenesis and wilderness and Zagros mountain ranges is situated at north and west north in this county and rather have not high diversity aspect of plant species. purpose of In this work identity the ethnobotanical medicinal plants of this region by endemic science , identified and studied for medicinal usages. In this work at time of 2011 and 2012 years the ethnobotanical medicinal vascular angiosperm plants of this region were collected, identified and studied for medicinal usages.

As a results, 27 species belonging to 27 genera and 18 families of were reported from the Genaveh County. Lamiaceae with 5 species and Asteraceae with 3 species were the largest families respectively. Local medicinal usages of these plants were also reported. Of the main medicinal plant species in the zone may imply to *Ziziphus spinachirsti*, *Haplophyllum canaliculatum*, *Cichorium intybus*, *Citrullus colocynthis*, *Teucrium polium*, *Alhagi camelorum* and *Peganum harmala*.

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**ALLELOPATHIC EFFECT OF DIFFERENT CONCENTRATIONS OF
CARAWAY ESSENTIAL OIL ON GERMINATION
CHARACTERISTICS IN AMARANTH AND BARNYARDGRASS**

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Allelopathy plays a major role in both natural and managed ecosystems for ecological weed management. In order to study the impacts of different concentrations of caraway (*Bunium persicum* L.) seeds on decreasing in germination characteristics and preliminary growth of amaranth (*Amaranthus retroflexus* L.) and barnyardgrass (*Echinochloa crus-galli* L.), an experiment was performed based on completely randomized design with six replications at the Special Crop laboratory, College of Agriculture, Ferdowsi University of Mashhad, during year of 2010. Treatments were five concentrations of caraway essential oil including 0, 100, 200, 400 and 800 ppm. The results indicated that the effect of different concentrations for essential oil caraway was significant ($p \leq 0.05$) on final germination (FG), mean germination time (MGT), germination rate (GR) and radicle and plumule lengths for amaranth and barnyardgrass. By increasing in essential oil concentration FG, GR and radicle and plumule lengths were declined and MGT was enhanced for two weeds. With increasing in essential oil concentration from zero to 800 ppm declined MGT for up to 89 and 90% amaranth and barnyardgrass, respectively. The effect of caraway on decreasing of germination characteristics for amaranth was higher than barnyardgrass. It was concluded that caraway essential oil could be considered as an ecological approach for weed control in organic agriculture.

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**ANTIBACTERIAL ACTIVITY OF POLYPHENOL AND
ANTHOCYANIN-RICH EXTRACTS OF
THYMUS KOTSCHYANUS AERIAL PARTS**

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The genus *Thymus* L., known as “Avishan” in Persian, is a well known aromatic perennial herb originated from Mediterranean region. Among 215 species of this genus grown in the world, 14 species are distributed in Iranian flora [1]. *Thymus* species are well known as medicinal plants because of their biological and pharmacological properties. In traditional medicine, leaves and flowering parts of *Thymus* species are widely used as tonic and herbal tea, antiseptic, antitussive and carminative as well as treating colds. *Thymus* oils and extracts are widely used in pharmaceutical, cosmetic and perfume industry also for flavoring and preservation of several food products [2]. Despite the considerable biological activities shown by a lot of *Thymus* species investigated, there are few studies that evaluate Iranian *Thymus* species.

In this work we investigated the effect of polyphenol and anthocyanin-rich extracts of *T. kotschyanus* aerial parts on growth of test microorganism cultures. The results showed that polyphenol and anthocyanin-rich fractions suppressed the growth of both gram-positive and gram-negative bacteria cultures. These results confirm the potential use of polyphenols and anthocyanins extracted of *T. kotschyanus* in food industry for the preservation of foodstuffs against bacteria and for increasing the shelf life of foodstuffs.

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**ANTIOXIDANT ACTIVITY OF FLAVONOID-RICH FRACTION FROM
THYMUS KOTSCHYANUS AERIAL PARTS**

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Flavonoids represent a ubiquitous and abundant group of polyphenols consumed in the diet, primarily from fruits and vegetables. These compounds are derived from plants and act as antioxidants due to their free radical scavenging properties, their ability to reduce the formation of free radicals [1], and their ability to stabilize membranes by decreasing membrane fluidity [2]. This effect may inhibit lipid peroxidation in vascular endothelial cell membranes, reducing mobility of free radicals in the lipid bilayer. The antioxidant properties of flavonoids may contribute to mounting evidence that a diet rich in fruits and vegetables reduces the risk of cardiovascular disease [3]. Flavonoids have been reported to have a beneficial influence on oxidative stress, vascular function, platelet function, and immune responses that may be involved in the process of atherogenesis.

Present study has been carried out to examine antioxidant activity of flavonoid-rich fraction of *Tymus kotschyanus* aerial parts. Antioxidant activity of flavonoid-rich extract was investigated by employing different in vitro assay systems, i.e. DPPH and nitric oxide radicals scavenging, reducing power, scavenging of hydrogen peroxide, linoleic acid and iron ion chelating activity, in order to understand the usefulness of this plant as a foodstuff as well as in medicine. The results indicated that flavonoid-rich fraction of *T. kotschyanus* aerial parts possess good free radicals scavenging and antioxidant activity.

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**EFFECT OF DIFFERENT LEVELS OF NITROGEN FERTILIZER ON
ESSENTIAL OIL COMPONENT IN “*DUCROSIA ANETHIFOLIA*”**

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Genus of *Ducrosia* has three species of herbaceous perennial named *D. flabellifolia*, *D. Assadi* and *D. anethifolia*. The first two species are endemic to Iran. *Anethifolia* specie besides Iran, also grow in Afghanistan, Pakistan, Syria, Lebanon, Iraq, and the Arabic countries in southern Iran. *Ducrosia anethifolia* (Moshgak), is a two year or perennial herb with Opaque green or greenish cabbage like color, with no Fluff, and a height of up to 100 centimetre. This experiment investigated the effects of different levels of nitrogen fertilizer upon physicochemical properties of Moshgak herb; In a split plot design with three replications, which implemented at Bari essence research farm in 2010. Fertilizer invoice included 4 levels of nitrogen fertilizer: zero, 100, 200 and 300 Kg/ hectare. The land at the time of Planting was in fallow status. The 30 tons Manure, 70 kg of urea, 50 kg of Potash, and 50 kg of phosphate fertilizer (in hectare) incorporated into the land before planting and mixed thoroughly with the soil. Moshgak seeds gathered from natural areas around Kashan and planted in the month of Aban, and Irrigation done immediately after planting. Two-thirds of urea (150 kg/ hectare) Consumed during the rapid growth of the herb. Aerial parts of the plant taken at the right time (early seed formation) with margins removed. Sampling took from the center of each plot, and the essential oils removed by a hydrodistillation apparatus. The decanal in essential oil of each treatment determined via a GC technique. The results showed that the average weight of the oil in zero kilograms of fertilizer per hectare is equal to 0.4 percent while with 200 kilograms of fertilizer per hectare it reached 0.3 percent. However, the oil did not change with increasing fertilizer. The conclusion was that the herb could have a better condition in term of percent essential oil if it grows in wild.

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**COMPUTATIONAL IDENTIFICATION OF NOVEL CONSERVED
MICRORNAs, AND THEIR TARGETS IN *EUCALYPTUS GRANDIS***

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Eucalyptus is a traditional aboriginal remedy for a variety of ailments. Today many species of genus *Eucalyptus* are used as medicine in pills, liquids, inhalers and ointments for the treatment of various medical conditions such as flue, cold, fever and bronchial infection [1]. MicroRNAs (miRNAs) are a class of non-coding single-stranded RNAs that regulate expression of genes at post-transcriptional levels. Evidence has shown that miRNAs play multiple roles in biological processes such as development, cell proliferation and apoptosis [2]. In an attempt to identify new conserved miRNAs in *Eucalyptus*, previously known plant miRNAs were used for searching their homolog in *Eucalyptus grandis* genomic sequences. The sequences showing homology with no more than four mismatches were predicted for their fold back structures and passed through a series of criteria including 1) a RNA sequence can fold into an appropriate stemloop hairpin secondary structure, 2) a mature miRNA sequence site in one arm of hairpin structure, 3) no loop or break in miRNA sequences, 4) predicted secondary structures had higher negative energy ≤ -18 kcal/mol. Based on these criteria we identified 16 putative novel conserved miRNAs in *Eucalyptus* belonging to 12 miRNAs families. A total of 10 potential target genes for these miRNAs were identified in *Arabidopsis*. The predicted *Eucalyptus* miRNAs were used as a query against *Arabidopsis thaliana* DFCI gene index (AGI) release 15 using miRU ([http://bioinfo3.noble.org/psRNA Target/](http://bioinfo3.noble.org/psRNA%20Target/)) with the criteria including 1) Maximum expectation value 3; 2) Multiplicity of target sites 2; 3) Range of central mismatch for translational inhibition 9-11 nucleotide; 4) Maximum mismatches at the complementary site ≤ 4 without any gaps.

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**EVALUATION OF DIGITALIS NERVOSA PERFORMANCE IN
NORTHERN PARTS OF IRAN**

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Digitalis nervosa of the scrophulariaceae family is an endemic species in Iran and lanatoside A is its most common cardiac glycoside. *Digitalis* is a bushy plant, and normally biennial. In the first year of growth crown oval leaves, long and sharp edges are formed and the number of crown leaves made at the first year is 15 to 20. Bell-shaped flowers are orange-yellow with light brown spots in the center. Fruit is a capsule containing numerous seeds. The leaves contain steroidal glycoside ingredients of nutritious heart. *Digitalis nervosa* were studied in three regions including plane area (46 m above sea level), forest area (1236 m above sea level) and pasture area (2033 m above sea level) in Mazandaran province and a region between forest and pasture (1033 m above sea level) in Gilan province. The results showed the highest yield (9.60 g dry weight) in forest area and the lowest amount (4.90 g dry weight) in the plain area in Mazandarn province. the amount of crop yield (6.76 g dry weight) in the forest area in Mazandarn, compared to yield (6.40 g dry weight) of an area (1033 m above sea level) in Gilan province of had no significant difference.



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**ALLELOPATHIC POTENTIAL OF GALBANUM DIFFERENT
TISSUES ON GERMINATION TRAITS AND PRELIMINARY GROWTH
OF LAMBSQUARTERS**

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Medicinal plants usually release many kinds of secondary metabolites that could be used for weed management based on organic principles. In order to evaluate germination characteristics and preliminary growth of lambsquarters (*Chenolodium album* L.) affected by aqueous extracts of galbanum (*Ferula gummosa* Bioss.) shoot and root tissues, an experiment was conducted based on completely randomized design with four replications at the Special Crop laboratory, College of Agriculture, Ferdowsi University of Mashhad, during year of 2010. Treatments were five concentrations of aqueous extracts for galbanum shoot and root such as zero, 5, 10, 20 and 40%. The results showed that the allelopathic effects of galbanum different tissues were significant ($p \leq 0.01$) on final germination (FG), germination rate (GR), time to 50% germination and radicle and plumule lengths of lambsquarters. By increasing in concentration of aqueous extract FG, GR and radicle and plumule lengths decreased and time to 50% germination enhanced. With increasing in aqueous extract concentration from zero to 40% decreased FG and GR for lambsquarters up to 100%. Also, allelopathic effects for decreasing in lambsquarters germination were higher for root than shoot of galbanum. So, it concluded that the allelopathic traits of galbanum could be considered as an ecological approach for weed management based on organic agriculture.

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**EFFECT OF IRRIGATION INTERVALS AND PHOSPHOROUS
CONTENT CARVACROL AND ESSENTIAL OILS OF
THYMUS VULGARIS L.**

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Thyme (*Thymus vulgaris* L.) is a perennial and aromatic plant from (Lamiaceae) family. The essential oil of thyme is reported as 10 important essences that is anti-bacterial, anti- microbial, anti- oxidant and cause of delay the mammals senescence [1]. Essential oil of thyme is enriched by phenolic compounds which are antibacterial, anti- microbial and also use as flavoring in food industry duration of irrigation and phosphorous fertilizer are important factors that affect the quality and quantity of essential oil plants. Therefore in this study various qualitative and quantitative of thyme essence are investigated during different duration of irrigation and levels of phosphorous fertilizer.

The experiment was conducted in farm of the college of Agriculture Azad University of Saveh, Iran. The experiment was laid out in a completely randomized block design with two treatments, phosphorous (four levels 150,200,250,300 kg/ha) and four replications. The maximum yield of dry, wet, essence and thymol were obtained by 5 days duration of irrigation and the most percent of essence was obtained in level 3 of duration of irrigation phosphorous fertilizer has significantly effect on dry matter yield and carvacrol in 1% level. As the highest dry yield was in level four of phosphorous and highest dry yield was in level three of phosphorous.

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THE ROLE OF THE USE OF THE PHOSPHORUS AND DURATION OF IRRIGATION ON YIELD AND THYMOL OF *THYMUS VULGARIS* L.

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Thyme (*Thymus vulgaris* L.) is a perennial and aromatic plant from (Lamiaceae) family. The essential oil of thyme is reported as 10 important essences that is antibacterial, anti-microbial, anti-oxidant and cause of delay the mammals senescence[1]. Essential oil of thyme is enriched by phenolic compounds which are antibacterial, anti-microbial and also use as flavoring in food industry duration of irrigation and phosphorous fertilizer are important factors that affect the quality and quantity of essential oil plants. Therefore in this study various qualitative and quantitative of thyme essence are investigated during different duration of irrigation and levels of phosphorous fertilizer.

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THE COMPARISON BETWEEN ARBESCUAR MYCORRHIZAL AND SALICYLIC ACID ON SOME ANTIOXIDANT COMPOUNDS IN *OCIMUM BASILICUM* L. UNDER SALINITY STRESS

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Salinity toxicity is a world wide agricultural and eco-environmental problem. Many literatures showed that arbuscular mycorrhizal and salicylic acid can enhance salt tolerance of many plants. In this study we comparison the effect of *Glomus intraradices* and salicylic acid (0/2 mM) against sodium chloride (75, 150 mM) stress. This experiment was performed with four replicate in completely randomized design on hydroponically-culture in greenhouse condition.

The results showed that salinity causes to decrease percent of root mycorrhizal colonization, anthocyanin amount, while it increased flavonoids in wavelength 300 and 330 nanometer. In pretreating plants with salicylic acid and inoculating them with mycorrhizal fungus, content of anthocyanin and flavonoids was increased and pretreating with salicylic acid lead to resistance of basil plant to ward salt stress. According to these results, it can be concluded that inoculating plants with mycorrhizal creates better resistance in basil plant relative to pretreating with salicylic acid in saline conditions [1-3].

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EVALUATION OF DIFFERENT DRYING METHODS ON
ESSENTIAL OIL AND ESTRAGOL CONTENTS OF TARRAGON

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Tarragon (*Artemisia dracuncululus* L.) is an aromatic and medicinal plant that contains up to 3% essential oil, whose aroma is dominated by the phenyl propanoids methyl chavicol (also called Estragol) and its isomer anethol. In order to study the impacts of various drying methods on drying time and qualitative characteristics of tarragon, an experiment was conducted based on completely randomized design with six replications at the Special Crop Laboratory, College of Agriculture, Ferdowsi University of Mashhad during year of 2012. Leaves dried at three temperature with oven (30, 40 and 60°C) and natural methods (shaded and sunny airs). The drying process was continued until the moisture content of leaves reduced about 10% based on dry weight. The results indicated that the effects of different drying methods were significant ($p \leq 0.01$) on essential oil and Estragol contents of tarragon. By increasing in oven temperature declined drying time for leaves. The maximum Estragol and essential oil contents were observed in shaded air (with 2.9 and 69.8%, respectively) and their minimum were in 60°C oven (with 1.1 and 24.8%, respectively).

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COMPARISON BETWEEN *FOENICULUM VULGARE* AND *VITEX AGNUS CASTUS* ON OVULATION IN THREE SPOT GOUIRAMI

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In this research comparison between effects of *Foeniculum vulgare* and *Vitex agnus castus* on gonadotropic system in three spot gouirami were investigated. For this purpose after dechlorinated the water of aquarium, 100 immature female fishes with mean weight 1.5-2.5 were released in aquariums. Different doses of *V. agnus* and *F. vulgare* (10, 20, 30 and 50 mg/kg) were injected 0.02 ml as IM. Duration of injection for 20 days was continued. Fish was anesthetized in twentieth day. Results showed that Gonadosomatic index (GSI) increased in 50 mg/kg in *F. vulgare* treatments but GSI decreased in *V. agnus*. Significant differences between treatments *F. vulgare* and *V. agnus* were observed, compared with control groups ($P < 0.001$). The mature cells and the diameter of oocyte was only increased at 50 mg/kg *F. vulgare* treatment.

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**DESIGN AND FABRICATION OF MAGNETIC NANOPARTICLES FOR
HERBAL MEDICINE DELIVERY APPLICATIONS**

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According to accession of new incurable disorders including various species of tumors, new bioactive molecular entities are emerging. Among them, herbal medicines have recently gained more attention due to their lower side effects, ease of production and lower costs of production. However, these kinds of medicines such as curcumin, taxol, comptothecin, irinotecan, etoposide and etc. are mostly hydrophobic. One of the referred methods to overcome this problem is trapping drugs in hyperbranched polymer structure through hydrophobic-hydrophobic interaction. Magnetic nano particles are one of the most interesting carriers in simultaneous drug delivery and magnetic resonance imaging application. Among the different species of magnetic nanoparticles, Fe₃O₄ nanoparticles are more interesting, because of their biocompatibility characteristics. In this research, the magnetic nanoparticles of iron oxide will be synthesized by co-precipitation method and then these particles are coated with bioactive glass by sol-gel method. The very thin shell of bioglass guarantees mono dispersity and biocompatibility of the carrier. Moreover the bioglass shell improves the carries stability. In the next stage, the hyperbranched polymer, polyglycerol, will be grown on core- shell structure by polymerization of glycidol. The hyperbranched polyglycerol creates suitable site for drug loading. According to this fact that most of drugs are hydrophobic, polyglycerol could significantly increase the drug loading by hydrophobic-hydrophobic interactions. In addition, using hyperbranched polymer enables us to load extra useful agents including radiotherapy agent, targeting agent, fluorescent agent and etc. The carrier is characterized with X-ray diffraction (XRD), scanning electron microscopy (SEM), dynamic light scattering (DLS), thermo gravimetric analysis (TGA), vibration sample magnetometer (VSM) and Fourier transform infrared spectroscopy (FT-IR) [3,4].

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**CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITIES OF
PHLOMIS RIGIDA LABILE ESSENTIAL OIL**

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The genus *Phlomis* L. (Lamiaceae) comprises about of 100 species which are distributed through Mediterranean region toward central Asia and China [1]. In Iran, this genus consist of 17 species, of which 10 species are endemic [1]. Previous study on essential oil of some species of *Phlomis* including *P. olivieri*, *P. pungens*, *P. persica*, *P. lanata*, *P. grandiflora*, *P. cancellata*, *P. Bruguieri*, *P. aucheri* and *P. elliptica* have been reported [2]. The essential oils of *P. rigida* (albino and normal form) from Turkey obtained from the aerial parts by hydrodistillation have been analyzed by GC and GC/MS [3]. *P. rigida* oils have been found to be rich in β -caryophyllene (31.2% and 38.7%, respectively) and β -selinene (13.1% and 15.1%, respectively). The essential oil from *P. rigida* (collected from Kermanshah province) obtained by hydrodistillation has been analyzed by GC and GC/MS. The main components were (E)-caryophyllene (41.5%), (E)-beta-farnesene (6.7%) and alpha-humulene (4.8%). The antimicrobial activity of oil was determined against some bacteria and fungal strains. Also the oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests.

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**POLYMER COATED MAGNETIC NANOPARTICLES AS A NOVEL
CARRIER IN CURCUMIN NANOMEDICINE**

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In recent decades herbal drugs have been used in cancer treatment due to their special therapeutic features. Among them one of the main components of the diet, turmeric, has great potential in disease prevention. Curcumin is one of its components and have special pharmacological properties such as anti-tumor, anti-inflammatory, antioxidant and antibacterial properties. Curcumin has an effective treatment against many cancers such as breast, prostate, bone, lung, gastrointestinal, etc. The interesting point in using curcumin is its biocompatibility toward healthy cells while most of cancer drugs and chemotherapeutic agents affect both healthy and cancerous cells. Despite these properties, curcumin has low solubility in aqueous environments and this makes an obstacle for using it in cancer treatment [1,2].

Many methods have been offered to solve this problem such as using different types of nanocarriers. Magnetic nanoparticles (MNPs) are significant candidates that have great potential to make changes in theranostic techniques. However fabrication of monodisperse and biocompatible magnetic nanoparticles for physiological environment has been created remarkable challenges. To reach these purposes, coating MNPs with polymers is one of the best options [3-5]. In this research the magnetic nanoparticle was coated with hyperbranched polyglycerol. Polyglycerol made suitable sites for more drugs loading through hydrophobic-hydrophobic interaction due to hydrophobic nature of curcumin. In addition this functionalization of surface with hyperbranched polymer perform additional sites for loading extra agents such as targeting agent, imaging probe for MRI applications and etc. The in vitro effects of these nanodrugs on different cancer cell lines are examined to exhibit their cytotoxicity toward cancer cells and lack of cytotoxicity toward other cells.

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**EFFECT OF ALTITUDE ON THE RUTIN AND CHLOROGENIC ACID
CONTENT OF *SAMBUCUS EBULUS* LEAVES IN GOLESTAN
PROVINCE**

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Sambucus ebulus is known as Aghti in Iran from *caprifoliaceae* family and perennial herb with numerous pharmacological functions like hemorrhoid, bites, sore-throat, anti-inflammatory, anti-nociceptive, anti-cancer, anti-angiogenetic and anti-oxidative activities. Low information about Iranian sambucus encouraged to do some investigation on it. The main purpose of this study was to investigate the effect of altitude on the quality of leaves. Plants were collected from three different altitudes of gorgan including 100, 700 and 1800 MSL, based on a randomized complete block design with three replications. The rutin and chlorogenic acid content of samples were measured using HPLC. Besides that, parameters like dry weight, moisture content and the rate of chlorophyll were also measured. Results showed that, the content of rutin and chlorogenic acid of samples was significantly influenced by altitude. Mean comparison exposed the maximum rate of rutin (18.16ppm) was in tuskestan zone with a 100 MSL and the maximum rate of chlorogenic acid (1.78ppm) was in

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**THE EFFECT OF IRRIGATION INTERVAL AND PLANT DENSITY ON
THE AMOUNT OF ACTIVE INGREDIENT LINOLEIC ACID AND
OLEIC ACID IN THE OIL OF BLACK CUMIN (*NIGELLA SATIVA*)**

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Nigella sativa seeds are used in traditional medicine in many countries to prevent and treat of disorders and diseases such as cough, asthma, toothache is consumed. Bassim Atta reported that black cumin seeds source wealthy of unsaturated fatty acids and more than 50% of its oil essential fatty acids. Pospisil in Egypt effect of plant density on percentage of essence and black cumin oil examined and reported that by increasing plant density yield oil and essence increased[1,2]. Oleic acid and linoleic acid are two important unsaturated oil compounds in black cumin. The main objective research is to find out amount of unsaturated fatty acid. This research was carried out in a factorial completely randomized design with two factors irrigation period and plant density in Imam higher education center. Irrigation period was (one and two weeks) and plant density was (50-100-150 P/m²). Soxhlet set was all extraction gas chromatography (GC). Determine the oil compound and the treatment. Results show that the higher amounts of linaloic acid was found in the treatment one week irrigation interval and 100 P/m² (50.32%) when the less amount in the treatment of one week irrigation interval and 150 p/m² (33.59%). the higher amounts of oleic acid was found in the treatment one week irrigation interval and 50 p/m² (27.61%) when the less amount in the treatment of two week irrigation interval and 50 p/m².

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**THE EFFECT OF DROUGHT STRESS ON SOME BIOCHEMICAL AND
PHYSIOLOGICAL PARAMETERS OF THE *LIPPIACITRIODORA***

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The uses of medicinal plants for the treatment diseases in humans have a long history. It is estimated that more than 10% of the thousands of plant species known to have medicinal uses. *Lippiacitriodora* H.B.K. (synonyms: *Verbena citriodora* Cav, *Aloysiacitriodora* Ort. Et Palav and *Verbena triphylla* L Herit) is an herbal species of the Verbenaceae family. In this study The effects of drought stress, simulated by increasing concentrations of PEG, were examined on the biochemical and physiological parameters of *lippie citriodora*. It has been used to concentrations %5, %10, %20 and %25 PEG (6000) for applying of drought stress. Relative water content (RWC) content was significantly reduced under water stress conditions showed little change. The proline and protein content increased under drought stress condition. Increases in proline content suggest that proline is one of the common compatible osmolytes under water stress condition. The malondialdehyde (MDA) content increased with the increases of drought stress.

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**SILYMARIN REGULATES PHARMACOKINETIC OF
ATORVASTATIN IN DIABETIC RATS**

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Previous studies indicate that diabetes induces hepatic enzymes of Cytochrome P450 3A2 in rat. We also showed that Silymarin (SMN) regulates the diabetes-up regulated mRNA level of CYP 3A2 [1]. The present study carried out to investigate SMN effect on pharmacokinetics of Atorvastatin as a substrate of CYP 3A2 in streptozotocin-induced diabetic rats. Diabetes was induced by single injection of streptozotocin (50 mg/kg, b.w., i.p.) in male adult rats. Diabetic rats were sub grouped to three separate groups (n=6) as follow: non-treated diabetic (D), diabetic atorvastatin-treated (DA), and diabetic SMN + ATV treated groups. To compare a group of rats were treated only atorvastatin (A). The control and non-treated diabetic rats received saline normal. On day 29, the A, DA, DAS groups were treated with 10 mg/kg atorvastatin orally. To study the pharmacokinetics of atorvastatin, plasma samples of the A, DA and DAS groups were collected at 0, 3, 6 and 24 h after the atorvastatin administration. Following the extraction of plasma samples by using absolute ethanol and acetonitrile, the purified residues were resolved in mobile phase (*Acetonitrile; Methanol: Water, 30:30:40, V/V/V*) and injected for HPLC analyses. The peak areas for various concentrations of atorvastatin were plotted against the given concentrations of drug and the obtained calibration curve was used for the further estimation of plasma concentrations. Pharmacokinetic parameters such as area under the curve [AUC], elimination half time, $[t_{1/2}]$, and peak plasma concentration (C_{max}) were calculated using non-compartmental model "WIN NOLIN". The plasma concentration of atorvastatin was expressed as μ g/ml of plasma. Diabetes resulted in a significant ($P < 0.05$) reduction of AUC (Control = 6.98 ± 0.58 vs diabetic rats = 4.35 ± 0.24 h*mg/ml) and C_{max} values (control = 0.52 ± 0.03 vs diabetic group = 0.33 ± 0.01 μ g/ml), while the SMN received group showed remarkable recovery of diabetes-reduced values of AUC and C_{max} . The SMN-treated diabetic rats showed a prolonged T_{max} and $t_{1/2}$ time for atorvastatin. Our data suggest that due to profound influence of diabetes in atorvastatin pharmacokinetic parameters, it should be taken in account dose adjustment for atorvastatin administration in diabetic patients. Moreover, SMN regulation on the diabetes-up regulated CYP 3A2 activities, suggesting its constructive effect for providing a possible combination therapy.

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**EFFECT OF SALICYLIC ACID AND NITRIC OXIDE ON
GERMINATION AND SUBSEQUENTLY SEEDLING GROWTH OF
BORAGO OFFICINALIS UNDER DROUGHT STRESS**

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SA is a phenolic hormone involved in cell signaling. It mediates numerous physiological processes and induced plant tolerance to various biotic and abiotic stresses [1]. SA interacts with NO in signaling pathway and NO have also been shown to regulate SA biosynthesis [2]. In this research, effect of salicylic acid and Nitric oxide on germination and subsequently seedling growth of *Borago officinalis* was investigated. Seeds pretreated with SNP (a donor of NO) or SA or both and drought stress was performed with increasing of irrigation intervals. Results showed that drought stress reduced significantly seed germination and subsequent seedling growth. SNP and SA improved seed germination indexes and fresh and dry weight of seedling growth. Treatment with SA plus methylene blue (a NO scavenger) reduced SA-induced drought tolerance in borage seedlings. Therefore SA improved germination and subsequently seedling growth of *Borago officinalis* under drought stress in an NO-dependent manner.

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**DETERMINATION THE CRITICAL PERIOD OF WEED CONTROL IN
MEDICINAL PLANTS OF SAFFLOWER (*CARTHAMUS TINCTORIUS*)
CULTIVAR SOFE IN THE ARAK**

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The critical period of weed control can vary in a wide range between years and locations, even when the same genotypes and agronomical practices are adopted because the crop weed competition for light, water, and nutrients is influenced by factor such as the diversity of weed species, climatic variation, soil properties, and time of weed emergence. (1,2). Experiment have been done in order to the termination critical period of weeds control in safflower experiment in the form of complete randomize block in spring of 2012 in province (Arak), village of Masomie. A quantitative series of treatments comprising two components, (a) increasing duration of weed interference and (b) increasing length of weed-free period, were imposed. Critical period was determined through Logistic and Gompertz equations. The results showed that the critical period for weed control, crop yield to avoid an unacceptable reduction in growth during the first eight weeks of safflower. The highest and lowest yield 1533.81 and 1094.61 Ha, in Trial treatments was kept either weed free and weed interference. The onset of interference seems to be less variable than its conclusion, indicating that early weed control is necessary to prevent yield loss. Also, with increase in as the weed interference period increased so yield components (number of heads per plant and number of seeds per head) decreased significantly.

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DETERMINATION OF HEAVY METALS IN LYCIUM RUTHENICUM
MURRY PLANT

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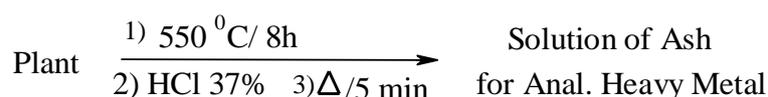
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Heavy metals can be both beneficial and detrimental to human health. Some heavy metal such as nickel, copper, molybdenum and zinc are believed to be essential nutrients for humans [1]. These metals act as catalytic cofactors for many enzymes and provide structural integrity in proteins or are involved in synthesis of a range of neuroactive amines and peptides. Others such as selenium are not essential but may be beneficial to health. Selenium may help prevent cancer and heart disease when ingested in at low level but is detrimental to health at high concentration. Some heavy metals have no apparent impact on health while others, such as arsenic, bismuth, cadmium, lead and mercury are considered toxic. Lead accumulates in different organs of the body and can cause damage to the brain and peripheral nerves while other heavy metals cause feelings of nausea, vomiting, abdominal cramps and headaches [2].

Lycium ruthenicum Murry with native name "Gorg tigh" a member of Solanaceae family is a unique nutritional food, which widely distributes in desert of Birjand, Iran. In this study, the quantity of heavy metals include Ag, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Se and Zn in Lycium ruthenicum Murry have been determined using atomic absorption spectroscopy.



The results showed that the leaves are rich in Cr, Co, Zn and Se (0.8602 mg/kg, 0.5337 mg/kg, 1.811 mg/kg and 5.765 mg/kg, respectively), whereas the high quantity of Ni, Mn, Fe and Cd (1.665 mg/kg, 32.156 mg/kg, 398.685 mg/kg and 0.0212 mg/kg, respectively) exist in the root.

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**EFFECT OF MAGNETIC FIELD AND NANO-PARTICLES OF
TITANIUM DIOXIDE (TiO₂) ON SEED GERMINATION AND
SEEDLINGS EARLY GROWTH OF AJOWAN (*AMMI COPTICUM* L.)**

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Nanotechnology as the science of working with the small particles is an approach to improve the efficiency of agricultural systems. In order to study the effect of nano particles of titanium dioxide (TiO₂) and Magnetic fields on seed germination and early growth and seedling characteristics of *Ammi copticum* (L.) a factorial experiment was conducted based on completely randomized design with three replications at agricultural research laboratory of Birjand University in 2012. The first factor was seed priming with TiO₂ (in levels of 0 and 200 ppm), the second factor was intensity of magnetic field with three levels of 50, 100 and 200 mT and the third factor was the time when seeds exposed in magnetic field (with three levels of 30, 60 and 120 minutes). Two control treatments were considered (without any treatments and just priming with titanium dioxide nano-particles. Results indicated that priming with nano-particles of TiO₂ significant effect on mean time germination, germination rate, seedling fresh weight and shoot, root and seedling length. The interaction effect of intensity time of field magnetic which exposed seeds on root length was significant ($p < 0.01$). The lowest length and weight of seedling was observed in treatment of 100mT of field magnetic for 60 minutes and the highest length of seedling obtained in treatment of 100 mT for 30 minutes. The most root length observed in 50 mT for 120 minutes. Germination percentage of seeds was not affected by any of examined factors.

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EFFECT OF SI NANO-PRTICLES AND MAGNETIC FIELDS ON SEED GERMINATION AND SEEDLING GROWTH CHARACTERISTICS OF (*SECURIGERA SECURIDACA* L.)

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Using of Si nano-particles and magnetic field as a new technology can improve the seed and seedlings properties of medicinal plants for better establishment. To evaluate the effect of these factors on seed germination and seedling growth characteristics of *Securigera securidaca* (L.) a factorial experiment was conducted based on completely randomized design with three replications at research laboratories of Birjand University in 2012. Experimental factors were intensity of magnetic field (320 and 580 mT), time duration of seed exposure (1, 2 and 4h) and seed priming by nano-particles of Si (0 and 200 mM). Results showed that the germination rate, seedling length and seedling fresh weight, were significantly increased when seeds prime by Si nano-particles. Germination percentage and rate also significantly affected by time duration of seed exposure in magnetic field ($p < 0.01$). Use of magnetic field could significantly increased fresh weight of seedlings ($p < 0.05$). The Interaction effect of Si nano-particles intensity of magnetic field was significant. The most germination percentage of *Securigera securidaca* was observed when the intensity of 580 mT of magnetic fields used for duration of one hour in primed seeds.

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**DETERMINATION OF TOTAL PHENOLIC, FLAVONOID CONTENTS
AND ANTIOXIDANT ACTIVITY IN AQUEOUS AND ALCOHOLIC
EXTRACTS OF CROCUS SATIVUS L. STIGMA**

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Saffron (*Crocus sativus* L.) is a plant of the iridaceae family. The dried intact stigmas of saffron are widely used as a condiment, medicinal plant and food additive in the different countries. Recently, saffron extract was found to have anti-cancer activities against different carcinoma cells. Many of these medicinal properties of saffron can be attributed to a number of its compounds such as crocins, phenolic, flavonoid and other substances having strong antioxidant and radical scavenger properties. The importance of antioxidants in maintaining health and protection from cancer is of great interest in revealing the antioxidant compounds of spice or herb plants. In this study, we used water and different concentrations of methanol and ethanol for bioactive compounds extraction. The purpose of this work was to determine total phenolic as well as flavonoid contents in the different extracts of saffron using Folin-ciocalteu reagent and a colorimetric method, respectively and to measure their antioxidant activity by 1, 1-diphenyl-2-picryl hydrazyl (DPPH) method. The total phenolic and the total flavonoid contents varied from 27.51 to 45.06 mg g⁻¹ DW expressed as gallic acid equivalents and from 0.055 to 0.635 mg g⁻¹ DW expressed as quercetin equivalents, respectively. The antioxidant activity related to DPPH radical scavenging of different extracts was in the order of ethanol extract > methanol > aqueous extract. The results showed that *Crocus sativus* stigma ethanolic extract could be considered as a bioresource of phenolic compounds with high antioxidant activity.

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**EFFECT OF DIFFERENT NITROGEN SOURCES ON QUANTITATIVE
AND QUALITATIVE CHARACTERISTICS OF PARSLEY
(*PETROSELINUM CRISPUM* MILL.) IN JIROFT REGION**

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Parsley has a very high nutritional value, containing A, B and C vitamins and mineral nutrients. Chemical compound and purity of different fertilizers of one element are very different. This difference has an important effect related to object, method and the time of application, and affectivity of fertilizers. The most common mineral nitrogen sources in nutrition of higher plants are nitrate, ammonium and urea, having different chemical characteristics and different effects on plant growth. Therefore, in order to investigate the effect of different nitrogen sources on parsley an experiment was conducted in a factorial combination of three nitrogen forms (calcium nitrate, ammonium sulphate and urea) and four nitrogen levels (0, 100, 125, 150 kg ha⁻¹) with completely randomized basic design and three replications. The results showed that the effect of nitrogen sources was significant on all measured parameters. As the highest shoot fresh weight, root fresh weight, vitamin C and leaf Ca concentration obtained at 150 kg ha⁻¹ of calcium nitrate and the highest shoot dry weight, plant height, leaf length and leaf iron concentration at 150 kg ha⁻¹ of ammonium sulphate and the highest amount of chlorophyll a, chlorophyll b and chlorophyll a+b at 150 kg ha⁻¹ of urea. Comparison studies conducted by Eugeniusz [1] and Lisiewska [2] proved that leafy type of parsley produced higher yield characterized by beneficial share of leaf blades in total above ground biomass, containing lower amount of dry matter and vitamin C, showing higher tendency for nitrates accumulation than tuber rooted one. These results are in harmony with those obtained Petropoulos *et al.*, [3].

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WOODY BRANCH AND LEAF ANATOMY OF TWO SUBSPECIES OF
FRAXINUS ANGUSTIFOLIA VAHL. (OLEACEAE) IN IRAN

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Fraxinus angustifolia Vahl., ash, from Oleaceae, is distributed in west and northwest of Iran. The antioxidant activity of extracts of *Fraxinus angustifolia* as a medicinal plant used to treat inflammatory-related disorders was determined [1]. The medicinal product of the bark and leaflets obtained from the leaves, contain coumarin derivatives, catechic tannin, pentacyclic triterpenic acids (ursolic acid), mannitol, inositol, glucose, organic acids [2]. Azadi (2005) considering the type of the margin serration on edge of the leaflet divided this species into two subspecies; subsp. *syriaca* and subsp. *persica* and also considering existence the hair on the petiole and rachis, divided each of these two subspecies into two varieties: *F. angustifolia* subsp. *syriaca* var. *syriaca*, *F. angustifolia* subsp. *syriaca* var. *pilosa*, *F. angustifolia* subsp. *persica* var. *persica* and *F. angustifolia* subsp. *persica* var. *pubscense* [3, 4]. In this study we investigated the anatomical features of leaf (leaflets, petiol, rachis, and hair, lower and upper epidermis) and woody branch structure in four varieties of two subspecies. The petiol has nearly circular shape, with flat adaxial side and modified by two latero-adaxial wings. Epidermal cells are isodiametric with thin cuticle. Under the epidermis is a zone of two–three layers of collenchyma. The hypodermic area continues with a meatus-type parenchyma, which bounds the conducting fascicles to their abaxial side. Phloem ring appears interrupted from place to place. In *F. angustifolia* subsp. *syriaca* var. *pilosa* and *F. angustifolia* subsp. *persica* var. *pubscense* hairs on the rachis are clearly visible. In the leaf's limb conducting fascicles in midrib from adaxial are distinctively separated by lignified rays. Significantly in the midrib of *F. angustifolia* subsp. *persica* var. *persica*, there are two layers of phloem and two layers of xylem in the site of bundle sheath. Palisade parenchyma cells are located in both sides of leaf and sometimes number of spongy parenchyma cells between them causes the irregularity in the leaf's limb. The hairs are of two kinds: linear and secretory. In cross sections of branch, cork layer is clearly visible and in some parts lenticel is obvious. cork cambium and bast fibre, phloem, cambium layer and xylem are observed respectively toward the center of branch. The central pith comprises parenchyma cells.

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THE EFFECT OF NUTRITION WITH MICROELEMENTS ON YIELD
OF *ROSA DAMASCENA* MILL

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Adequate nutrition is one of the main factors in affordable production of medicinal plants, especially *Rosa damascena* Mill and using micronutrients foliar spray is one of new methods for increasing medicinal biomass production. It should be noted that the major problem of *Rosa* product is quantity yield reducing in the second half of flowering period. In most part of the country, it flowers in the second month of spring and, at this project, it was from 1-22 May. Therefore, this project was performed to investigate quantity yield of *Rosa damascena* influenced by 4 micronutrients foliar spray level (0, 1, 2 & 3 times) at Research Institute of Alborz, as a randomized complete blocks with 3 replications in 2011. The results showed that the effect of foliar spray number were different for flowers number harvested on days 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15 ($\alpha \leq 0.01$) and on days 4, 16 & 18 ($\alpha \leq 0.05$). The average comparison indicated that the highest and lowest number of flowers belonged to 2 foliar spray on 9th day (403/33 n/plant) and free foliar spray on 22th day (12.86 n/plant), respectively. Furthermore, the highest and lowest flowers number during flowering period (1-22 May) observed on 2 foliar spray (3496/9 n/plant) and control (2439/1 n/plant) treatment, respectively. The results showed that the best fertilizer treatment was 3 foliar sprays that increase the number of flowers on 2th half of flowering period (12-22 May) and solve the problem of quantity reducing.

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**THE APPLICATION OF MEDICINAL PLANTS, ANTIBIOTIC AND
THEIR EFFECTS ON SERUM COMPOSITION IN BROILER
CHICKENS**

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An experiment was conducted under completely randomized design to evaluate the effects of three mixed medicinal plants and antibiotic virginiamycin on serum composition of broiler chicks. One hundred and twenty day-old chicks (mixed male and female) were procured and divided into three treatments and four replicates (10 chicks in each replicate). The mixed medicinal plants consisted of basil, parsley and cinnamon. Experiment treatments were included: 1) Control (without growth promoters), 2) Antibiotic (15 ppm virginiamycin), 3) Blend of medicinal plants (15 g kg⁻¹). Serum composition was studied of 8 chicks from each treatment at the end of experiment. As result was revealed, Broilers fed 15 g/kg mixed medicinal plants, had a significantly lower concentration of serum triglyceride and elevated high-density lipoprotein (HDL) at day 42 (P<0.01). The reduction of serum triglyceride and raising HDL cholesterol by mixed medicinal plants observed in the present study might be due to the reduction of synthetic enzyme activities. medicinal plants inhibition effect on hepatic β -hydroxymethylglutaryl coenzyme A (HMG-CoA) reductase, cholesterol 7 α -hydroxylase, and fatty acid synthetase [1]. But serum uric acid and cholesterol were not effected by dietary treatments. Broilers fed virginiamycin, had a significantly more concentration of serum LDL (p<0.05).

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**EFFECT OF BIO-FERTILIZERS AND MICRONUTRIENTS ON
GERMINATION CHARACTERISTICS OF AJOWAN
(*CARUM COPTICUM*)**

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Application of biological fertilizers, especially growth stimulants bacteria instead of using chemical fertilizers and micronutrient elements is one of the most important nutritional strategies in sustainable management of agroecosystems. In this regard, in order to evaluate the effect of bio-fertilizers and micro-nutrients on Ajowan germination characteristics, a factorial experiment based on CRD was conducted with three replications at Birjand Agricultural Research Laboratory. Experimental treatments consisted of bio-fertilizer application with three levels including without inoculation, and seed inoculation with *Azospirillum* and *Azotobacter* and seed enrichment with ten levels including without enrichment, and enrichment using Fe, Zn, Mn, which includes three levels one, two and three mM. The results showed that Ajowan seed inoculation with biological fertilizers and micronutrients significantly increased germination rate, root and shoot length, root fresh weight and dry weight of root and shoot compared with the control. However, inoculating and enrichment of seeds did not have a significant effect on germination percentage and shoot fresh weight. The greatest and lowest germination rate were observed where seeds enriched using 1 mM of Mn (2.164 seeds per day) and Zn (1.588 seeds per day), respectively. The maximum and minimum values of root fresh weight were obtained from combined treatment (*Azospirillum* and Mn₃) and Mn₃, respectively. Moreover, the highest and lowest values of root length were observed with the combined treatments (*Azospirillum* and Fe₂) and (*Azospirillum* and Zn₃), respectively. The maximum and minimum values of shoot length were obtained from the combined treatments (*Azospirillum* and Mn₂) and (*Azospirillum* and Zn₃), respectively. According to the results of this study, application of bio-fertilizers and micronutrients on Ajowan seeds could be employed as an effective approach for improving the growth characteristics of this medicinal plant species.

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**EFFECT OF HYDROALCOHOLIC EFFECT OF
CITRULLUS COLOCYNTHIS FRUITS ON CYSTS OF GIARDIA LAMBIA
IN INVITO**

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Giardia lamblia is an intestinal flagellate of important protozoan parasites of medical and public health in Iran and the world [1]. Given the importance of treatment in patients with Giardiasis, particularly with the use of medicinal plants and parasite resistance to chemical drugs, in the present study the effect of hydroalcoholic extract of *Citrullus colocynthis* on the cystic stage of the *Giardia lamblia* in vitro was done. In this experimental study hydroalcoholic extracts of *C. colocynthis* prepared in 10, 50, 100 and 200 mg/ml concentrations, and cysts of *Giardia* isolated from stools of patient by sucrose solution 0.85M. Then, hydroalcoholic extract after diluting affected on *Giardia* cysts, the results were compared with the control groups [2]. Results of this study indicated that concentration of 100 and 200 mg/ml of hydroalcoholic extracted of *C. colocynthis* after 3 and 6 hours has the most killing and cytotoxicity activity on *G. lamblia* cysts in vitro. According to our results, the concentration of 200mg/ml of *C. colocynthis* after 6 hour has the highest cytotoxicity effect on *G. lamblia* cysts. Therefore, the in vivo study on *C. colocynthis* in animal models is recommended.

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**EVIDENCE OF ANTIFUNGAL ACTIVITY OF MADDER
(*RUBIA TINCTORUM* L.) ON SOME FUNGAL PLANT PATHOGENS**

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With the increasing worries of pesticide residues in agricultural products and environment as well as the incidence of resistance in plant pathogens against chemical pesticides, the use of non-chemical methods including natural plant products have expected greater significance. Preliminary studies showed that methanolic extract taken from roots, leaves, stems and seeds of madder (*Rubia tinctorum* L.) inhibits the mycelial growth of *Fusarium oxysporum* f.sp. *melonis* with maximum inhibitory effect observed for root extract. In the present study, methanolic extract taken from roots was tested on the mycelial growth of *Monosporascus cannonballus*, *Phytophthora drechsleri*, *Pythium aphanidermatum*, *Verticillium dahliae*, *Macrophomina phaseolina*, *Rhizoctonia solani*, *Acremonium* sp., *Cladosporium cucumerinum*, *Alternaria* sp., *Phoma* sp. and *Ulocladium* sp. The extract caused a significant decrease in the mycelial growth of the majority of fungi tested *in vitro* with maximum activity detected for *R. solani* and *M. cannonballus* (%100), followed by *P. aphanidermatum* (%83.4) and *P. drechsleri* (%77.7) respectively. This study showed the potential inhibitory effects of root extract of madder on phytopathogenic fungi which can be used as an alternative or integration with controlling strategies in the management of cucurbitaceous fungal plant pathogens.

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DIVERSITY OF CHEMICAL COMPOSITIONS OF THE ESSENTIAL OILS OF WILD POPULATIONS OF *MYRTUS COMMUNIS* L FROM KHUZESTAN AND LORESTAN PROVINCES, SOUTHWEST IRAN

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Myrtus communis L (myrtle) (Myrtaceae) is an evergreen shrub which grows mainly in Mediterranean climates and, has long been used by locals for its culinary and medicinal properties [1]. In Iran, the species commonly known as “Mord or Mort” is abundant in the Zagros Mountainous Range of the country [2]. *M. communis* L has been used since ancient times for medicinal, food, and spice purposes. In Iranian folk medicine, *M. communis* L has been used as an infusion for various purposes such as for the skin discords, digestive discords, astringent, good hair condition, bronchodilatator, activities etc [2, 3]. Wild populations of *M. communis* L collected from Khuzestan and Lorestan Provinces, Southwest Iran, were examined for chemical variability in leaves. The essential oils obtained by hydro-distillation, were analyzed by Gas Chromatography-Mass Spectrometry. GC and GC-MS analyses revealed forty compounds, constituting 90.1–99.9% of the essential oils. The results showed that the major components of the oil were α -pinene (22.3-55.2%), 1,8-cineole (8.7-43.8%) and linalool (6.4-14.5%). The results of the present study indicated the essential oil components of wild populations of *M. communis* L can be varied with genetic, environmental conditions and geographic origin. The essential oils of *M. communis* L were characterized by high levels of oxygenated monoterpenes (24.7-66.9%) including 1,8-cineole, linalool and α -terpineol, followed by monoterpene hydrocarbon (22.3-58.5%) including α -pinene and limonene.

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ANTIMICROBIAL EFFECTS OF ZINGIBER OFFICINALE

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Ginger is used notably as spice in food. The oleoresin extracted from the root of plant contains 6-gingerol and is an active pharmaceutical material and has antibacterial, antioxidant and insecticide effects [1]. In this study, we extracted and purified the 6-gingerol and inspected its efficacy in 4 strains of bacteria. Two of the bacteria were Gram positive and 2 of them were Gram negative. Minimum inhibitory concentration (MIC) was determined for each of them. MIC was determined based on GLSI protocol [2]. The mentioned bacteria were cultured in Luria Betani medium under optimum temperature, time and shaking rates by the time that the number of bacteria reached to 1.5×10^8 per milliliter. Then, a serial dilution of 6-gingerol from 50-800 $\mu\text{g}/\mu\text{l}$ was loaded in the 96-well plates which contained a certain amount of culture media with bacteria. After 24 hours incubation in 37°C, the optical density was measured at 600 nm, and the MIC was determined for each of them.

Bacteria	Test	MIC ($\mu\text{g}/\text{ml}$)	MIC of ref.
Gram-negative			
<i>Escherichia coli</i>		154	512
<i>Enterobacter aerogenese</i>		308	32
Gram-positive			
<i>Enterococcus faecium</i>		115	512
<i>Staph. aureus</i>		38	198

¹ Ampicillin, Tetracycline, vancomycin and gentamycin were used as references for Gram-positive and Gram-negative bacteria, respectively.

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**EXTRACTION OF VOLATILE COMPOUNDS OF *THYMUS VULGARIS*
L. BY MICROWAVE RADIATION AND COMPARISON WITH
HYDRODISTILLATION METHOD**

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The genus *Thymus* L., known as “ Avishan” in Persian, is a well known aromatic perennial herb originated from Mediterranean region. Among 215 species of this genus grown in the world, 14 species of the genus *Thymus* are found in Iran among which the majority are endemic [1]. *Thymus vulgaris* is one member of the *Lamiaceae* family that has antibacterial and antifungal effects [2, 3]. The essential oil of *T. vulgaris* was analyzed by GC-MS and twenty-one compounds were identified in the hydro-distillation (HD) method representing 98.3 % of oil and the main constituents were thymol (43.8%) , p-cymene (21.1%) and γ - terpinene (6.6%). The microwave assisted hydrodistillation (MAHD) technique has been compared with the conventional method. As a result, twenty-three compounds were identified by MAHD representing 99.1 % and the major constituents were thymol (43.4%), p-cymene (17.3%) and estragole (8.0%). Important advantages over traditional hydro-distillation normally; shorter extraction times; higher oxygenated compounds; environmentally friendly; lower production of by-products; lower cost and saving energy. The result showed that MAHD is an effective method and can be used for the analysis of volatile compounds in medicinal plants.

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RESPONSE OF COSTMARY (*TANACETUM BALSAMITA*) TO FOLIAR APPLICATION OF UREA AND AMINO ACIDS

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Costmary (*Tanacetum balsamita*) is a herbaceous, rhizomatous perennial plant belonging to the Asteraceae family. It has been used in Iranian folk medicine as general tonic, hepatoprotective, antiallergic, sedative, cardiogenic, and flatulent [1]. To study the foliar application effects of three nitrogen sources on some growth parameters and essential oil content of costmary a pot experiment was conducted in completely randomized design with three replications. The treatments were foliar application of urea (1, 2 and 3%), glutamic acid (50, 100 and 200 mg/l), aspartic acid (50, 100 and 200 mg/l) and control (without foliar application). The results showed that plant height, leaf number, leaf area, essential oil content and yield were significantly affected by treatments. No significant differences were observed among treatments for stem diameter. The highest and the lowest plant height, leaf number and essential oil yield were obtained in 200 mg/l aspartic acid and control, respectively. The highest leaf area was observed in 200 mg/l glutamic acid that had no significant difference with 200 mg/l aspartic acid. The control and aspartic acid in 50 mg/l had the highest essential oil content (0.84%). The lowest essential oil content (0.54%) was observed in 1% of urea.

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**INFLUENCE OF IRON ON THE ACCUMULATION OF SOME
MEDICINAL COMPOUNDS IN PARSLEY**

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Essential oil presents in spice plants as dietary sources possess bioactive properties protecting against some diseases. In present study, the effect of Fe application (21 ppm, for 8 hours) on essential dry matter, oil production, its constituent and phenolic compounds of parsley (*Petroselinum crispum*) were studied. Essential oil was extracted by clevenger distillation and total components were identified by GC and GC-MS method. Results showed that dry matter and essential oil content were decreased in response to iron in compare to control plants. In both plants, the major compound was myristicin, however, it was reduced in response to excess iron. Interestingly, decrease in phenolic- based essential oil, like myristicin, due to increase in terpenoid – based essences like germacrene, sesquiphelandrene or elemene. These results accompanied with reducing in soluble phenolics in plants. It seems that iron application would shift essential oil biosynthesis pathway from phenolics biosynthesis to terpenoids pathway [1].

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**EVALUATION OF CYTOTOXIC EFFECT OF NANOLIPOSOMAL
6-GINGEROL ON BREAST CANCER MCF-7 CELL LINE**

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Breast cancer is the most common cancer among women. Heterogeneity in breast tumors and their internal pressure leads to reduction of proper response to anticancer drugs. The side effects of drugs have limited their consumption [1]. This study aimed to reduce the side effects and increase the therapeutic index of the drug. Nano drug delivery of 6-gingerol extracted from *zingiber officinale* was used for this purpose. Liposomes are used as new drug delivery systems [2]. They lead to long circulation and reduction of the side effects of the drugs.

Nanoliposomal 6-gingerol was prepared using reverse phase evaporation method. In this method, different concentrations of phosphatidylcholine, cholesterol, 6-gingerol and dextran were completely mixed in ethanol and then sonicated for increasing the homogeneity and entrapment efficacy. The mean size of nanoliposomes was measured by Zeta sizer instrument and obtained about 345 nm. Entrapment efficiency was determined by ultracentrifuge and was about 85%. Release pattern of the drug from nanocarrier was measured during 28h using dialysis method and was obtained about 25.85%. Viability test was done using MTT assay. The results showed that after 24 hours treatment of cancerous cell line, MCF-7, with nanoliposomal 6-gingerol, the viability of the cells was decreased about 10% in comparison with control.

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**EVALUATION OF GINGEROL EXTRACTED FROM ZINGIBER
OFFICINALE AGAINST BREAST CANCER**

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Breast cancer is one of the complicated diseases and the second cause of death among the women [1]. Gingerol is the most important constituent in *zingiber officinale* plant. This extract inhibits the growth of cancerous cells especially colorectal cancer cells in human. The impact of this extract on breast cancer tumor has not been investigated yet. In this study we inspected its cytotoxicity against breast cancer cell line MCF-7 [2]. The cell line was purchased from cellular bank of Pasteur Institute of Iran. RPMI-1640 medium, standard 6- gingerol, MTT and other materials were obtained from Invitrogen Company. 6-gingerol was extracted and purified from *Zingiber officinale* plant and its concentration was determined by standard material. Different dilutions of 6-gingerol was prepared and its cytotoxicity on the breast cancer cell line was evaluated using MTT assay during 24 h. The viability and IC₅₀ was determined using Pharm program. The obtained IC₅₀ value was 17 µg/ml. The results showed that the viability of cancerous cell line was reduced notably, as the gingerol concentration increased.

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EFFECT OF GROWTH REGULATORS ON CALLUS INDUCTION IN SAFFRON

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Crocus sativus L. (family Iridaceae) is an important crop cultivated for its red stigmatic lobes that constitute the high valued saffron of commercial use. Saffron is a perennial autotriploid vegetatively propagated plant where breeding is generally difficult. In recent years application of tissue culture for the large scale propagation and genetic improvement of saffron has been emphasized. Compared with the traditional method, plant tissue culture offers a great potential for callus induction. In this study callus induction of *Crocus sativus* L. was investigated in different combinations of growth regulators (TDZ, NAA, 2, 4-D, BA and Kinetin). Lateral meristems were cultured on MS medium contained 3% sucrose and 7% agar and were maintained in darkness at 25°C. The highest frequency of callus induction was observed in media containing 2 mg/L 2, 4-D plus 1 mg/L BA and 1 mg/L 2, 4-D plus 0.15 mg/L Kin, however, in case of growth parameters such as diameter and area of calli the best result obtained in medium supplemented with 2 mg/L 2, 4-D plus 1 mg/L BA.

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FUMIGANT TOXICITY OF TWO ESSENTIAL OILS ON THE
MEDITERRANEAN FLOUR MOTH, *EPHESTIA KUEHNIELLA* ZELLER
AND IDENTIFY OF THEIR CHEMICAL COMPONENT

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In recent decades, using chemical pesticides for pests control in a wide range has been caused adverse environmental consequences. Plant essential oils are aromatic compounds which obtained by steam distillation from medicinal and aromatic plants [1]. Most of essential oils are composed of two major groups of chemical composition including terpenes and phenyl propene. Terpenes are common and abundant and among them monoterpenes are given more importance. This research aim was to study the insecticidal effect of two essential oils of *Laurus nobilis* and *Myrtus communis* on the Mediterranean flour moth. Experiments were carried out at controlled conditions (25±2°C and 65±5% RH). For identify of chemical composition of the studied essential oils apparatus GC-MS (Varian quadrupole mass 1200 model) was used. LC₅₀ values of *L. nobilis* essential oil after 24 hours for stage of one day old egg, 2nd larvae instars, 3rd larvae instars, 4th larvae instars and adult were recorded as 32.37, 10.67, 18.18, 26.08 and 1.60 µL/L air, respectively. Also, LC₅₀ value of *M. communis* essential oil after 24 hours for stage of egg of 1 day, 2nd larvae instars, 3rd larvae instars, 4th larvae instars and adult were recorded as 33.37, 71.89, 19.79, 38.29 and 0.60 µL/L air, respectively. The most important chemical compounds identified in essential oil of *M. communis* was including Cyclofenchen (34.9%), Eucalyptol (28.8%), Linalool (12.1%), Linalool format (9.7%). The most important chemical compounds identified in essential oil of *L. nobilis* is including Eucalyptol(56%), Alpha terpineol (28.43%), Sabinen (19.57%), Cyclofenchen (15.7%), Eugenol methyl ether and 4 – Terpineol (8.42%), Beta caryophyllene and Linalool (6.0%), Psi limonene and Alpha – Terpineol (4.41%).

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**EFFECT OF DIFFERENT DRYING METHODS ON DRYING TIME AND
ESSENTIAL OIL CONTENT OF ANISE HYSOP (*AGASTACHE
FOENICULUM* L.)**

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Drying is one of the important post harvest processes of medicinal plant that has a major role in quantity and quality of their active substances. Anise hyssop (*Agastache foeniculum* L.) is a medicinal and perennial herb plant belonging to the Lamiaceae family. Anise hyssop essential oil used in pharmaceutical and food industries. This study was conducted to evaluate the effects of different drying methods on essential oil content of Anise hyssop. Anise hyssop leaves were harvested at flowering stage and dried by four methods (shade drying, sun drying, oven drying (40, 60 and 80 °C) and microwave oven drying (180, 360, 540, 720 and 900 W)) in a completely randomized design with four replications. The drying process was continued until the moisture content of samples reached about 11% based on dry weight. Dried leaves were subjected to hydro distillation using a Clevenger type apparatus to extract essential oil. The results showed that drying methods have significant effect on drying time and essential oil content. Minimum (4 minutes) and maximum (64 hours) drying time were obtained at 900 W microwave power and shade drying, respectively. The highest (1.51%) and the lowest (0.56%) essential oil content were observed in shade drying and microwave drying in 900 W, respectively. As oven temperature increased the drying time and essential oil content decreased. Although the essential oil content decreased with increasing microwave power, but the differences among 360, 540 and 720 W were not significant.

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**CHEMICAL CONSTITUTES OF THE ESSENTIAL OIL OF
TANACETUM KOTSCHYI (BOISS.) FROM KALLAR MOUNTAIN**

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The essential oils of *Tanacetum* species have been the subject of interest to phytochemists due to biological activity as insect antifeedants, antitumor agents, antimicrobial actions, and a host of other health related possibilities due to the content of terpenoids [1]. *Tanacetum kotschyi* (Boiss.) was selected for this study on the probable basis of therapeutic potential evidenced by time-honored claims from traditional medicine use and an extensive chemical and biochemical investigations [2]. *T. kotschyi*, a small, herbaceous perennial with a stem 8 to 25 cm tall with small white inflorescences and achene type fruit (2-2.5 mm long), grows naturally in Iran at 2500–3500 m asl in the rocky slopes of in Central Zagros, Southwest and West Iran [3]. The essential oils of *Tanacetum kotschyi* (Boiss.) inflorescences collected from alpine area of Zagros Mountains, Kallar (2700-3000 meters above sea level) in Chaharmahal va Bakhtiari province, Southwest Iran, were analyzed by gas chromatography (GC) and gas chromatography–mass spectrometry (GC–MS). GC and GC-MS analyses revealed compounds, constituting 77.5% of total essential oils. The major constituents of essential oils were α -bisabolol, camphor and carvacrol. (-)- α -Bisabolol has generated considerable economic interest, since it possesses a delicate floral odor and has been shown to have analgesic, pesticide, protesticide, fungicide, musculotropic, anti-peptic, antiarthritic, anti-septic, antibiotic, antioxidant, antimutagenic, anticancer and anti-inflammatory activity.

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**CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF
HERACLEUM LASIOPETALUM BOISS LEAVES**

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Heracleum lasiopetalum Boiss is a perennial aromatic herb distributed in Iran; with height of 100-150 cm. *H. lasiopetalum* Boiss is known as ‘Golpar-e barfi or Karsum’ and is distributed in Zagros Mountains Range, Iran [1]. *H. lasiopetalum* Boiss have been utilized as traditional medicines for antiseptic and antimicrobial, and also as a flavouring agent and spice for foods (especially meat) by the indigenous people of Chaharmahal va Bakhtiari, Iran [2]. Results of a previous study showed that germacrene-D (27.0%), α -zingiberene (8.8%), β -bisabolene (4.7%), β -sesquiphellandrene (4.0%) and *Z*- α -bergamotene (3.8%) were as the main compounds in *H. lasiopetalum* Boiss aerial parts [3]. The leaves of *H. lasiopetalum* Boiss collected from alpine area of Zagros Mountains, Kallar (longitude: 50° 53’ E, latitude: 31° 51’ N; altitude: 2700-3000 m above sea level) in Chaharmahal va Bakhtiari province, Southwest Iran at June 2012. The yellow oil of *H. lasiopetalum* Boiss was obtained by hydro-distillation in the yield of 0.1% based on dry weight. Gas chromatography–mass spectrometry (GC–MS) analyses revealed compounds. The major constituents of the essential oil of this herb were germacrene-D (42.01%), farnesol <(Z,Z)> (8.98%) and α -zingiberene (2.87%), that they were dominant among sesquiterpenes components.

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**CHEMICAL COMPOSITION OF THE ESSENTIAL OILS OF WILD
POPULATIONS OF *MYRTUS COMMUNIS* L FROM CHAHARMAHAL
VA BAKHTIARI PROVINCES, IRAN**

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Myrtus communis L (myrtle) (Myrtaceae) is an evergreen shrub which grows mainly in Mediterranean climates and, has long been used by locals for its culinary and medicinal properties [1]. Leaves are sources of essential oil that have various medical properties [1,2]. In Iran, the species commonly known as “Mord or Mort” is abundant in the Zagros Mountainous Range of the country [1]. *M. communis* L has been used since ancient times for medicinal, food, and spice purposes. In Iranian folk medicine, *M. communis* L has been used as an infusion for various purposes such as for the skin discords, digestive discords, astringent, good hair condition, bronchodilatator, activities etc [2, 3]. Wild populations of *M. communis* L collected from natural habitats in Chaharmahal va Bakhtiari province, Southwest Iran, were examined for chemical variability in leaves. The clear yellow oils of *M. communis* L was obtained by hydro-distillation in the yield of 0.6-1.4% based on dry weight, were analyzed by Gas Chromatography-Mass Spectrometry. The results showed that the major components of the oil were α -pinene, 1,8-cineole and linalool. Probably, the chemical variability of the essential oils attributed mainly to environmental conditions. The essential oils of *M. communis* L were characterized by high levels of oxygenated monoterpenes including 1,8-cineole and linalool, followed by monoterpene hydrocarbon including α -pinene.

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**RED CLOVER HYDROALCOHOLIC EXTRACT WITH HIGH PHENOL
CONTENT SCAVENGES FREE RADICALS**

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Red clover (*Trifolium pratense*) belongs to the plant family of *Leguminosae*. There is plenty of evidence indicating estrogenic activity of red clover-derived compounds. Serious fertility problems have been reported in animal models [1]. On the other hand, phytoestrogens (red clover) are a group of natural compounds that are used for the treatment of menopausal disorders. They have protective effects on disorders such as osteoporosis, cardiac risk factors or breast cancer [2]. In this study we aimed to clarify the total phenol content and ferric reducing power of both flowers and leaves hydroalcoholic extracts of red clover. Additionally, the free radical scavenging potency of either parts hydroalcoholic extract was determined. The total phenol content of leaves extract was found significantly ($P<0.05$) higher than that of flowers. Moreover, the DPPH scavenging activities for flowers and leaves at corresponding concentrations were found as 43.44 and 22/29 %, respectively. Both extracts showed remarkable antioxidant capacity in ferric reducing assay. Our data suggest that in addition of having known estrogenic property, various parts of red clover contains compounds with antioxidant effects. Moreover, the hydroalcoholic extract of red clover might be considered as a reliable source of alternative hormone replacement agents with antioxidant property which is essentially needed in chronic disease in particular in elder humans or animals.

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**SALT STRESS AND ZINC NUTRITION IN GERMAN CHAMOMILE:
DAMAGE OR PROTECTION?**

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Chamomile is a world known medicinal plant with increasing importance due to its effectiveness in several pharmaceutical applications. Plants in both natural and agricultural conditions are continuously exposed to biotic and abiotic stresses. A number of studies have focused on improving the understanding of chamomile tolerance to salinity and heavy metal stresses [1,3]. Zinc plays a fundamental role in several critical cellular functions such as protein metabolism and IAA metabolism [2]. Furthermore, zinc supply could mitigate the adverse effects of NaCl.

The present work is conducted to investigate the effect of zinc (1, 2 and 4 μM as zinc sulfate) levels on physiological characteristics of chamomile under 0, 60, 120 and 180 mM NaCl salinity levels. The experiment is set up as a complete randomized factorial design with three replications in a solution culture system. Results showed that increasing concentrations of NaCl decreased leaf protein levels, while increased the contents of sodium, zinc, ion leakage, proline and photosynthetic pigment leaves. Furthermore, the addition of zinc to NaCl-treated plants with decrease ion leakage contents and sodium levels apparently improved leaf physiological status, particularly in high salinity levels, although it had no significant effect on leaf sodium content.

According to the results of the experiments (I) chamomile plants can withstand moderate doses of NaCl in the medium, (II) increase of proline and chlorophyll contents in saline condition may be a mechanism for protecting plants from moderate doses of salt, and (III) plants treated with 4 μM Zn showed the maximum proline and zinc concentration under 180 mM NaCl salinity level, probably the addition of zinc to NaCl-treated plants caused increase in proline concentration and decrease in ione leakage, specially at 180 mM NaCl, therefore induced tolerance to salinity stress in chamomile and the plant growth was not negatively affected.

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**THE PARTHENOLIDE CONCENTRATION OF TANACETUM
PARTHENIUM IN CULTURE CONDITION**

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Tanacetum Parthenium L. is one of the indigenous plants of Hamadan province which found in gardens and near of brooks. This plant as herbal medicine is used for muscle relaxation, blood dilution, antiheadache and antimigraine purposes [1]. The function relevant to Parthenolide substances of the plant leaves [2]. In this study, *Tanacetum Parthenium L.* was cultivated in 6 Crete in Bu-Ali Sina Herbal Garden of Hamadan city. The plant was harvested in May and June 2012. The specimens of plant leaves were dried then extracted in chloroform using Soxhlet. The watery phase was separated with ethyl acetate then Parthenolide concentrations were measured by HPLC. The mean of Parthenolide concentrations were obtained 0.617 and 0.592 mg/ml for May and June, respectively. More investigation such as comparison the data to wild types of *Tanacetum Parthenium L.* and related soil analysis are suggested.

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**A STUDY ON TRACE ELEMENTS AND HEAVY METALS
PURCHASED IN CAMEL'S THORN MANNA, WILLOW MANNA,
POCKS PRAY MANNA, OAK MANNA FROM SELECTED MARKET IN
TEHRAN**

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Medicinal plants have played a key role in world health. About four billion people, 80% of the world's population, living in developing countries uses herbal medicine as their source of primary health care [1-3]. However, little is known about the contents of trace elements and heavy metals *contents* in Manna used in Iran. The aim of this study was to determine the level of Cd, Pb, and also trace elements (Zn, Cu, Fe) in Camel's Thorn Manna, Willow Manna, and Pocks pray manna, Oak Manna to assess the relative safety of these products based on world Standard limits and potential health risk to local inhabitants. 40 samples from 4 different Manna were purchased from Tehran's Market during 2012. The samples were analyzed according to standardized international protocols by wet digestion method. Certain weight of each samples were digested with nitric acid, hydrochloridric acid and analyzed by atomic absorbance spectrophotometer. All necessary precautions were taken to avoid any possible contamination of the sample as per the AOAC guidelines [4].

The concentration levels of trace elements and heavy metals on the samples were determined as means \pm SD of three replicates in each test and determined based on sample dry weight. Results were compared with the permissible limits (PI), acceptable daily intake (ADI) and provisional maximum tolerable daily intake (PMTDI) as set by world health organization (WHO) Cadmium was highly present in most of samples but lead, Zinc, Copper and Fe were in acceptable limits. By a comparison between acceptable global standards and the level of Cd on investigated herbal medicine and medicinal plants, our results showed that the majority of Manna samples had only higher level of Cd. it is probable that the metal was translocated through air dust blowing from nearby.

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**EFFECT OF SALICYLIC ACID AND SALT STRESS ON
ORGANOSULPHUR ANTICANCER COMPOUND IN BROCCOLI
SPROUTS**

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Brassica sprout, in particular broccoli (*Brassica oleraceae* var. *italica*) contain substantial amount of antioxidants, vitamin C and health-promoting compounds such as glucosinolates [1, 3, 5, 7]. Glucosinolates, one of the main health-promoting secondary metabolites in Brassica, are a group of sulphur- and nitrogen- containing metabolites. These compounds have gained much attention in recent years due to the remarkable anticarcinogenic activity of their major hydrolysis products, isothiocyanates [2]. Sulforaphane (SFN) is an isothiocyanate has proved to be an effective chemoprotective agent in cell culture, carcinogen-induced and genetic animal cancer models, as well as in xenograft models of cancer. Early research focused on the "blocking activity" of SFN via Phase 2 enzyme induction, as well as inhibition of enzymes involved in carcinogen activation [4]. Additionally, secondary metabolites are well known to be related to the plant defense response mechanisms, being induced in response to biotic and abiotic stresses [6]. The objective of the present study was to investigate the effect of NaCl treatments under different concentrations 0(control),50, 100, and 200mM with 0, 100, 200 μ M Hydroxy benzoic acid signaling molecule (salicylic acid) on the content on sulforaphane and vitamin C. salicylic acid recoverd the growth factor at the salt stress and increased vitamin C. Combination between salicylic acid and chloride sodium improved sulforaphane concentration. The highest concentration of sulforaphane achieved in 100 μ M salicylic acid and 100 mM chloride sodium. it is interesting that The highest amount of vitamin C was achieved at the treatment with high amount of sulforaphane. These results indicated that both of salt stress (100 mM of NaCl treatment) and salicylic acid could improve the nutritional value of broccoli sprouts, and germination of sprouts under adequate salt stress could be one useful way to enhance health-promoting compounds of plant food.

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**INVESTIGATION THE CARDINAL TEMPERATURES OF SAGEBRUSH
(*ARTEMISIA ABROTANUM*) AND ARTICHOKE (*CYNARASCOLYMUS*)**

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The medicinal plants find application in pharmaceutical, cosmetic, agricultural and food industry. The use of medicinal herbs for curing disease has been documented in history of all civilizations [1, 2]. Sagebrush and artichoke are belonging to useful medicinal plants and have so many uses in health care systems [3]. Sagebrush was historically used as an air freshener or strewing herb. Sagebrush is antiseptic and kills intestinal worms. It was used to treat liver, spleen and stomach problems. The leaves of artichoke is an herbal medicine and have been recognized from ancient times up to nowadays for their beneficial and therapeutic effects such as promotion of blood circulation, mobilization of energy reserves and induction of choleresis[4].

By considering to necessary temperatures for germination, a laboratory study carried out as complete randomized design with four replications to investigate the cardinal temperatures to germination for mentioned plant seeds. Different temperatures were zero to 45°C and it increased step by step with 5°C level in each survey. Germination performed in germinator in dark condition. Investigation of cardinal temperatures has done with linear regression between germination rate and temperatures. Results of experiment showed that rate of germination increased with rose in temperatures as well as each seed samples had its particular optimum temperature for germination. In this regard, optimum temperatures for sagebrush and artichoke were 37.97 and 25.36°C, respectively. Base and maximum temperature for Sagebrush were 13.32 and 44.47°C, respectively and these temperatures for Artichoke were 5.27 and 35.27°C respectively.

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**THE EFFECTS OF TIME HARVESTING AND IRRIGATION
INTERVALS ON THE ACTIVE INGREDIENT OF STINGING NETTLE
(URTICA DIOICA L.) LEAF**

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Stinging nettle (*Urtica dioica* L.) has been used as herbal remedy for the treatment of many diseases. The aerial parts of the plants are used as a blood purifier and diuretic, diabetes, rheumatism and etc. To study the effects of harvest times and irrigation intervals on active ingredients leaves of nettle, an experiment was done at the Barij Essence research farm in 2011-2012. SO, three harvest times (2012/06/30, 2012/07/20, 2012/08/10) and three irrigation intervals (3-days, 5-days, 7-day) has been done as spilt plot in randomized complete block design with three replication. According to chlorogenic acid active ingredients leaves are consist of the total amount of chlorogenic acid caffeoylmalic acid. It was observed that the most total amount of these acids was in third harvest time (2012/08/10) with irrigation intervals in 3-day and 5-day. With the interaction between this two factors, the most active ingredient in first and third harvest time was relate to irrigation intervals in 5-day and second harvest time was relate to irrigation intervals in 7-day. With the deletion harvest time effect, the most active ingredient is related to irrigation intervals in 5-day.



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**EFFECT OF SHALLOT EXTRACT ON FAT QUALITY OF SILVER
CARP (*HYPOPHTHALMICHTHYS MOLITRIX*) PASTE DURING
FROZEN STORAGE**

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Fish and shellfish provide an almost unlimited variety of unsaturated fatty acids with beneficial roles in human health . Carp, as a freshwater fish, has been one of the most widely cultured species all over the world due to its fast growth rate, easy cultivation and high feed efficiency ratio. So demand has come from the carp producers to develop alternative products to increase the carp consumption. Minced and paste fish as battered and breaded products are commonly stored and marketed in frozen form (2). Fish and fishery products can undergo undesirable changes during frozen storage and deterioration may limit the storage time. These undesirable changes result from protein denaturation and fat oxidation. So it is necessary to extend shelf life by application of natural preservatives which recently have more demand. Shallot is one of the popular components of many Asian diets specially sea foods. Shallot extract is consisting of flavonoids and polyphenolic compounds with antioxidant properties. The objective of this study was to determine the effects of Shallot extract on fat changes of Silver carp (*Hypophthalmichthys molitrix*) paste in frozen storage.

Silver carp past prepared from fresh sources and based on sensory evaluation, the highest shallot extract without any significant organoleptic changes determined and applied as a natural anti-oxidant preservative. Fish paste samples which were contained 1% shallot extract beside control group were packed and stored at -18 °c. Chemical indicators of fat oxidation consist of PV, TBA and fatty acid profile were analyzed periodically in 0-15-30-40-50-60-70 days of storage. Changes of polyunsaturated fatty acid (PUFA) and saturated fatty acid (SFA) and monounsaturated fatty acid (MUF) were determined during storage. Fish paste mixed with 1% shallot extract had the best score in sensory evaluation, fat oxidation indices such as peroxide value, tiobarbitoric acid amount and saturated fatty acids were increased in all fish past samples during frozen storage, but oxidation rate in samples which contained shallot extract were significantly slower than control group (P<0.05). The results demonstrated that application of shallot extract which is consist of antioxidant compounds can significantly reduce fat changes and extend the shelf life of Silver carp past via protection of fat oxidation.



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THE EFFECTS OF MYCORRHIZA AND THIOBACILLUS
INOCULATUON AND SULFUR APPLICATION ON GARLIC
(*ALLIUM SATIVUM*) GROWTH

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Garlic (*Allium sativum*) is one of the most important of medicinal crops. This study was conducted at Shahrood University of technology based on completely randomized block design with 12 treatments and three replications. The treatments were combination of mycorrhizal fungi inoculation (*Glomus mosseae*), thiobacillus bacteria and sulfur application (0, 75 and 150 kg/ha). Treatments include: 1) control plot, 2) mycorrhizal fungi, 3) thiobacillus bacteria, 4) mycorrhiza + thiobacillus, 5) 75kg/ha Sulfur, 6) 75kg/ha Sulfur + mycorrhiza, 7) 75kg/ha Sulfur + thiobacillus 8) 75kg/ha Sulfur + mycorrhiza + thiobacillus, 9) 150kg/ha Sulfur 10) 150kg/ha Sulfur + mycorrhiza, 11) 150kg/ha Sulfur + thiobacillus 12) 150kg/ha Sulfur + mycorrhiza + thiobacillus. The results of this study show that the effects of above treatments on plant height, diameter of bulb, no of clove, dry weight of clove, scape and bulb were significant. In all of mentioned characteristics the highest values were obtained from combination of 150 kg/ha sulfur with dual inoculation of mycorrhiza and thiobacillus (treatment no. of 12) and the lowest value were obtained from control plots. The plant height at T12 was 226.7 mm in compared with 163.5 and 164.2 for T1 and T3 respectively. Also the highest value of bulb diameter derived from T12, T11 and T10 (51.81, 48.31 and 48.15 mm respectively) and the lowest diameter obtained from T1, T2 and T3 (42.37, 42.62 and 43.51) mm. Results of this study show that the highest dry weight of bulb obtained from T12 (40.51 g) and the lowest value was related to control plots (21.02g/ plant). In other word application of 150 kg/ha sulphur with mycorrhiza and thiobacillus caused the dry weight of bulb increased about 92 percent. The number of clove significantly increased due to the application of 150 mg/kg sulphur with mycorrhiza and thiobacillus compared with control (14, 11 respectively). The highest value of clove dry v mycorrhiza and thiobacillus (12.46 g/plant) and lowest obtained from control (4.27 g/plant).

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ANALGESIC PROPERTY OF AQUEOUS EXTRACT OF *AJUGA CHAMAECISTUS* SSP. *TOMENTELLA*

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The genus *Ajuga* is used for treatment of joints pains, gout and jaundice in Iranian traditional medicine. *Ajuga chamaecistus* ssp. *tomentella* is an exclusive subspecies of *Ajuga chamaecistus* in the flora of Iran [1, 2]. This study was aimed to evaluate antinociceptive activity of an aqueous extract from aerial parts of *A. chamaecistus* ssp. *tomentella* using formalin test in mice. Indomethacin (10 mg/kg) and normal saline were employed as positive and negative controls, respectively. Oral administrations of some doses of the extract (200, 400 and 600 mg/kg), 30 min before formalin injection, had no effect against the acute phase (0-5 min after formalin injection) of the formalin-induced licking time. The extract with dose of 400 mg/kg showed very significant analgesic activity on the chronic phase (15-60 min after formalin injection), $p < 0.001$. The results of this study suggest that the aqueous extract of *A. chamaecistus* ssp. *tomentella* have got an analgesic property that supports traditional use of *Ajuga* genus for joints pains and other inflammatory diseases.

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ANALYSIS OF DIOSGENIN IN WILD YAM EXTRACTS BY HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY

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The wild yam (*Dioscorea villosa*) has been shown to be an important source of diosgenin, a steroid precursor of progesterone. Wild yam is used in alternative medicines to minimize post-menopausal symptoms and for the treatment of low progesterone levels. Diosgenin a steroidal sapogenin belonging to the triterpene group is of great interest pharmaceutically, since the former can be used as an anti-inflammatory or anti-neoplastic agent shows antiviral activity and cytotoxicity towards some cancer cell lines and has immunomodulating effects. It has an estrogenic action on the mammary gland, plays an important role in the control of cholesterol metabolism. The chromatographic separation of the underground parts extracts of *D. villosa* was carried out on C₁₈ Kromasil column (250 × 4.6 mm, 5µm) using mobile phase acetonitrile: water in the ratio of 90:10 v/v at flow rate 1 ml/min with PDA detection at 197 nm. The results showed the presence of free diosgenin in the crude extracts and its levels was 16 and 27% in dry material.

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**EVALUATION OF UV-B EFFECTS ON MORPHOLOGICAL AND
PHYSIOLOGICAL CHARACTERISTICS OF TWO CULTIVARS OF
CORIANDER (*CORIANDRUM SATIVUM* L.)**

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The impact of climatic change on crop production is a major global concern. One of the climatic factors, ultraviolet-B radiation (UV-B; 280–320 nm), which is increasing as a result of depletion of the global stratospheric ozone layer, can alter crop productivity[1]. Ultraviolet radiation is energetically capable of disrupting proteins[2]. An experimental study has been undertaken to evaluate Ultraviolet –B radiation effect on morphological and physiological characteristics of two cultivars of Coriander (*Coriandrum sativum* L.), from Esfahan and Hamadan. Growth parameters such as root and shoot fresh weight, root and shoot length, leaf area, leaf number, chlorophyll and carotenoid content were measured. Plants were grown in sand and soil vases. Plants were subjected to a based nutrient solution (Hoagland solution) after one week, 3 days a week. After 55 days, plants were for 2 weeks, under UV-B treatment (every day 20 minutes). Data were analyzed using SPSS software, and averages were compared by Duncan test. All of the experiments were carried out in 3 replicates. The results indicated that, UV-B radiation reduced fresh weight, length, leaf area, leaf number in both cultivars; and Hamadan cultivars were more sensitive rather than Esfahan cultivars.

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**DETERMINATION OF FATTY ACID PROFILE IN THE OILS OF
CYDONIA OBLONGA AND MESPILUS GERMANICA BY NMR
TECHNIQUES**

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Spectroscopic methods provide useful information about all fatty acids in vegetable oils. ¹H- and ¹³C-nuclear magnetic resonance spectroscopy (¹H- and ¹³C-NMR) can be used for quantitating of usual unsaturated fatty acids present in many vegetable oils (oleic, linoleic, and linolenic acids)[1, 2]. This study was aimed to analyse the oils obtained from seeds of *Cydonia oblonga* and *Mespilus germanica* by ¹H- and ¹³C-NMR. The result of this study indicated that the oleic acid was the most abundant unsaturated fatty acid in *C. oblonga* and *M. germanica*, 48.29%, and 46.11%, respectively. The present of linolenic acid in *C. oblonga* and *M. germanica* was 46.25, and 44.95, respectively and the oils of these seeds contain low present of linolenic acid, 1.29%, and 1.6%. It can be concluded that, NMR spectroscopic techniques are practical for the quantification of fatty acids in extracted oils.

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**COMPARATIVE SURVEY EFFECTS *CORIANDRUM SATIVUM* AND
ZIZIPHORA CLINIPODIOIDES POWDER IN DIETARY ON RBC, Hb,
Hct IN COMMON CARP (*CYPRINUS CARPIO*)**

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Carp by the name of *Cyprinus carpio* has been reared in the most countries of the world because of the unique rearing features and in Iran is also reared as one of an important high economical and more favorable species in the most parts of the country. The important role of immunology system in health keeping of aquatics and ensuring of their proper survival and growth during the growth period caused that the usage of the kinds of the motive and sustainable mixes of immunology system has been increased that the usage of the immunology motives by the herbaceous origin has the lower risk for environment and animal.

This study has paid to the comparative survey on effects of *Coriandrum sativum* powder and *Ziziphora cliniopodiodes* powder in dietary on some hemoral parameters in Common carp (*Cyprinus carpio*). For this purpose 72 numbers of common carp with average weight of 80 +5 gram by nutritional stipend containing of *Coriandrum sativum* powder (2g per 100g food), *Ziziphora cliniopodiodes* powder (2 g per 100 g food) and the control group with basal feed, have been treated for 2 month. After the experiment period, some of the fishes have been selected randomly and after anesthesia by clove powder, have been bled from the region of caudal peduncle After the Normality test Shapiro – Wilk and ANOVA and the comparison of the averages at the 0.5 confidence level by Diken separating test, the results showed no significant difference between the level of RBC, Hb, Hct, in treatments and control group ($P > 0.05$). This study indicates that *Coriandrum sativum* powder and *Ziziphora cliniopodiodes* powder had no significant effects on RBC, Hb, Hct in common carp (*Cyprinus carpio*).



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FURANOCOUMARINS FROM ROOT OF *PRANGOS FERULACEAE*

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Prangos ferulaceae (family Umbelliferae) is present in the Balkans, Italy, Sicily, W. Syria, Caucasia and Iran. It is perennial and grows to a height of 50–150 cm [1]. Previous phytochemical studies on this species have indicated the presence of coumarin and its derivatives [2, 3]. Given the widespread use with coumarin compounds, comprehensive studies to determine and identify the types of these compounds, in particular new types of these are needed. In this work, we identified two furanocoumarin named Isoimperatorin and Celerosid from roots and leaves of *P. ferulaceae* respectively. In order to purify of this compounds, plant roots and leaves were collected from Vanyar, East Azerbaijan province and Meshkin, Ardebil province (Iran), in May 2010 respectively. The crushed root and leave of plant were successfully extracted with Soxhlet, using *n*-hexane, dichloromethane and methanol. The hexanic and dichloromethane extracts were analyzed by VLC, TLC and CC techniques. The methanolic extract of leaves were purified by HPLC apparatus using ODS Column. The structure of the purified compounds was determined by spectroscopic methods (IR, UV, 1D and 2D NMR).

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**PERFORMANCE AND BLOOD PARAMETER OF BROILER
CHICKENS GIVEN CLOVE POWDER AND ESSENTIAL OIL REARED
UNDER HEAT STRESS**

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This study was conducted to study the effect of different levels of clove powder (CP) and its essential oil (CEO) of on performance and some blood parameters in broiler chicken under heat stress ($32\pm 2^{\circ}\text{C}$ for 8 hours). Three hundred and thirty six day-old broiler (Cobb 500) were divided into six treatments (with 4 repeats), as follow: Control group (no supplement with additives and vitamin E), 100 ppm vitamin E as positive control, 0.75% and 1.5 % CP and 200 ppm and 400 ppm CEO. Our results indicated that the treatment contain CP significantly ($p\leq 0.05$) decreased body weight at 11, 22, 42 and 49 day of age in compared treatments contain essential oil and vitamin E treatments. In starter (1-10 day), grower (11-22 day), finisher 1 (42-49 day) and total experimental period treatment contain CP significantly ($p\leq 0.05$) have a lower average daily gain compared treatments contain essential oil and vitamin E treatments. In grower and finisher1 periods CP significantly ($p\leq 0.05$) decreased the feed intake in compared to other treatments. FCR were significantly ($p\leq 0.05$) improved at starter period in 200 and 400 ppm CEO and at finisher1 in 1.5% CP treatment compared to other treatments. No significant difference in blood parameters between the treatments observed. In addition, highest and lowest levels of hematocrit were observed in chicken fed on 100 ppm vitamin E and 200 ppm CEO, respectively.

In summary, our results showed that the powder and essential oil of clove supplementation was favourable improved the performance of broiler chickens by alleviating the adverse effects of heat stress. Powder and essential oil of clove could be used as growth promoters and also as a replacement for synthetic antioxidant in broiler diets under heat stress condition.



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**STUDY THE EFFECT OF SALT STRESS ON SOME
MORPHOLOGICAL AND BIOCHEMICAL PARAMETERS OF
ARTICHOKE UNDER INVITRO CONDITIONS**

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Artichoke (*Cynara scolymus* L.) is a medicinal plant belonging to Asteraceae family. It is one of the oldest medicinal plant values because of its effective compounds. Salt stress is an important factor in pathways of primary and secondary metabolites biosynthesis. In this study the effect of different levels of salinity (0,50,150,300,600 and 1200 μ M NaCl) on some morphological and biochemical parameters such as callus weight and length as well as the chlorophyll content, carotenoid content and antioxidant activity of callus extract were investigate. Based on the obtained results of the mean value comparison using least significant difference test, in most cases a significant difference was observed between salinity levels. The highest length of the callus (2.2 cm) was observed in the samples treated with 1200 μ M NaCl. Contrary to that, the calluses grown in medium containing 300 μ M NaCl produced the smallest callus (1.57 cm). Samples treated with 1200 μ M NaCl had the maximum weight (1.55 g). Contrary to the callus mass growth the highest pigment concentration was observed in the samples in which treated with 300 μ M NaCl. A reduction in the content of pigments (Chlorophyll a, b and ab) was observed in salin concentrations of lower and higher than 300 μ M. Surprisingly, the antioxidant activity of callus extract was not significantly influenced by salinity. It seems that, salinity concentration was not high enough to stimulate dominant antioxidant agent production. A positive correlation was observed between length and weight of callus. Also a correlation was observed between studied pigments. In which a higher carotenoid content was observed in the callus with high concentration of chlorophyll (a, b, ab). Based on the obtained results it can be suggested that salinity had significant influence on the measured parameters. It seems that the used levels of salinity were not high enough to have distinctive effect [1, 2].

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**THE STUDY OF DIFFERENT HORMONS LEVEL IN CALLUS
PRODUCTION IN GARLIC (*ALLIUM SATIVUM*) TISSUE CULTURE.**

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In order to determination the best hormones treatment for callus production in garlic (*Allium sativum L.*) by tissue culture technique, an experiment was conducted with different levels of IBA, 2,4-D and BAP, with in factorial experiment in the base of complete randomised design with 4 replications. The meristemic cells which were collected from garlic embryo were sterilized with 70% ethanol (for 30 sec) and 1.5 percent sodium hypo chloride (for 15 min) then culture in MS medium. after one month , the explants were collected from root and shoot tip and cultured in MS medium with 3 levels of IBA and 2.4-D (0.1 , 1 , 10 μ M)and 2 levels of BAP (1 , 10 μ M) and their binary combinations . The results indicated that the highest percentage of callus production was obtain from treatment of 10 μ M IBA which were preserved in 24 hour of darkness for 4 month , in compared with other 58 treatment which did not show any significant diffrent with zero level of hormones treatment.

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**EVALUATION OF PHENOLIC COMPOUNDS CONTENTS AND
ANTIOXIDATIVE ACTIVITY IN LEAF AND SEED OF
(*PEGANUM HARMALA* L.)**

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Antioxidants are the main factors for neutralizing the free radicals which are active and harmful materials for human. Preparing antioxidant resources to reduce the effects of oxidation stress is important. Leaf and seed of *Peganum harmala* are rich sources of phenolic compounds which have not been much considered until now. In this study methanol extract is prepared of leaf and seed. Spectrometry procedure used for the evaluation of the amount of phenols and total flavonoid and antioxidant activity of the extracts measured by DPPH free radicals. The result indicate that in leaf and seed of *peganum harmala* the amount of the total phenols for leaf 0.262 ± 0.006 and for seed 1.60 ± 0.033 and the amount of total flavonoid for leaf is 0.349 ± 0.023 and for seed is 0.736 ± 0.012 and the collecting percent of the DPPH radical for leaf was 18.24 ± 1.060 and for seed 92.95 ± 0.333 was changeable. The result indicates that seed has more antioxidant activity than leaf and also has more phenols than that of leaf. The result reported by SPSS and Excel software.

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**EFFEC OF PECTIC ACID (PA) ON INDUCTION OF APOPTOSIS VIA
NO RELEASE IN HUMAN PROSTATE CANCER CELL LINE DU145**

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Chemical drugs which are used in cancer treatment contain several side effects. Nowadays researchers are interested in using herbal extracts in order to reduce the side effects. Pectin derivatives found in cell wall of plants can induce apoptosis in cancer cells via an unknown pathway [1]. We have used apple pectin or pectic acid (PA) to induce apoptosis in human prostate cancer DU145. In this study, the possible apoptotic role of nitric oxide (NO) release after PA administration in DU145 cells was under investigation. DU145 cells were treated with deferent concentrations of PA (0.5 to 3 mg/ml) in a period of 24 hours. The amount of NO release was determined via an indirect method with using Griess reagent [2]. We used ethidium bromide/ acridine orange (ET/AO) dye and fluorescent microscopy to study the induction of apoptosis in DU145 cells. Our results demonstrated that PA can induce apoptosis in DU145 cell line coincidence with significant increase of NO release. Therefore, we can propose that the induction of apoptosis by PA in DU145 cells may be related to NO release.

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**HYPOGLYCEMIC EFFECT OF HYDROALCOHOLIC EXTRACT OF
PARSTINACA SATIVA SEEDS IN NORMAL AND STREPTOZOTOCIN
INDUCED DIABETIC RATS**

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Nowadays, no-drug treatments (medicinal plants) are novel therapeutic approaches in the treatment of diabetes. This study aimed at assessing the effect of *Parstinaca sativa* seeds hydroalcoholic extract on the weight, blood glucose and insulin levels in normal and diabetic rats in comparison to control drug, glibenclamid. Thirty six male Wistar rats were randomly divided to six groups(as Normal control (NC), Diabetic control (DC), diabetic rats treated with plant extract 200mg/Kg (Dt0.2)and 400 mg/kg (Dt0.4), Normal rats treated with plant extract 200 mg/kg (Nt0.2),diabetic rats treated with 600µg/Kg Glibenclamide (DG). Glucose levels were measured before diabetes induction (with Streptozotocin) for four weeks. Insulin levels were measured only at the end of the experiment.

Blood glucose in Dt0.2 group in the first week showed a significant ($p<0.05$) reduction than DC group that this reduction increment during the second week to ($p<0.01$) and in the third and fourth weeks was reduced to ($p<0.0001$). Blood glucose in Dt0.4 group was significantly ($p<0.05$) lower than DC group. No significant differences ($p>0.05$) observed between Dt0.2 and Dt0.4 groups with DG group. Interestingly *Parstinaca sativa* seeds extract did not increased insulin levels in all treated groups ($p>0.05$ DC vs. Dt0.4, Dt0.2 and DG), but in DG group was significantly ($p<0.05$) more than DC group. DG groups showed significant weight increment during treatment period. These results show that *Parstinaca sativa* seeds hydroalcoholic extract has hypoglycemic effects in diabetic rats, this effect is increased in lower doses, but the mechanism of its effect is not by increasing insulin levels.



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**EFFECT OF APPLE PECTIN OR PECTIC ACID AND MODIFIED
CITRUS PECTIN ON NO RELEASE AND INHIBITION OF CELL
PROLIFERATION IN RAT PITUITARY TUMOR CELLS GH3/B6**

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Nitric oxide (NO) can both induce and suppress apoptosis according to the physiological conditions [1]. Recent investigations indicated that polysaccharides as pectin, in the cell wall of plants, are able to induce apoptosis in cancerous cells [2]. In the present study the amount of NO release from rat pituitary tumor cell line GH3/B6 after treatment with deferent concentration of modified citrus pectin (MCP), pectic acid (PA), SNP (as positive control) and L-NAME (as negative control) is under investigation. The cells were cultured in Ham's F12 medium which was completed with 10% FBS and treated with different concentration of MCP and AP. The cell proliferation inhibition rate was determined with MTT assay. The amount of NO release was assessed by an indirect method of using Griess reagent [3]. Our results demonstrated that 1mg/ml PA for 4 hours increased the amount of NO release up to 40% more than control in GH3/B6 cells otherwise none of MCP concentrations affect the secretion of NO. In addition, MTT assay determined significant proliferation inhibition rate for the cells with 2.5, 5 mg/ml of PA and 3, 5 mg/ml of MCP after 24 and 48 hours incubation. So the results suggest that PA may inhibit cell proliferation via induction of NO release in GH3/B6 cells but MCP shows its inhibitory effect on cell proliferation by another pathway.

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**HYPOLIPIDEMIC EFFECT OF HYDROALCOHOLIC EXTRACT OF
PARSTINACA SATIVA SEEDS IN NORMAL AND STREPTOZOTOCIN
INDUCED DIABETIC RATS**

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In diabetic patient, dyslipidemia caused an increase in the risk of cardiovascular disease. The search for a new drug with the potential of reduction or regulation of serum lipid and lipoproteins has received wide attention in recent years. The present study investigated the hypolipidemic effects of *Parstinaca sativa* in normal and streptozocin-induced diabetic rats. Thirty six male Wistar rats were randomly divided to six groups (as Normal control (NC), Diabetic control (DC), diabetic rats treated with plant extract 200mg/Kg (Dt0.2) and 400 mg/Kg (Dt0.4), Normal rats treated with plant extract 200 mg/Kg (Nt0.2), diabetic rats treated with 600µg/Kg Glibenclamide (DG). Diabetes was induced by IP single injection of streptozotocin (60mg / Kg). Rats were treated daily for four weeks. Levels of total cholesterol, triglyceride, LDL and HDL were measured at the end of the experiment.

Total cholesterol in Dt0.4 and DG groups was significantly ($p < 0.01$) lower than DC group. Also Dt0.2 group showed significant ($p < 0.05$) decrease, and another significant ($p < 0.01$) decrease between Nt0.2 and NC was observed. LDL and HDL in Dt0.4 group were significantly ($p < 0.05$), respectively, decreased and increased than DC group, and Dt0.2 showed significant ($p < 0.05$) increase in level of HDL than DC group. No significant differences ($p > 0.05$) observed in levels of triglycerides in all groups. Significant decrease ($p < 0.05$) was observed between DG group than root extract (in HDL and LDL). *These results show that the hydroalcoholic extract of Parstinaca sativa seeds has hypolipidemic effects in diabetic rats, these effects are better in plant extracts than Glibenclamid.*



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**STEM ANATOMICAL STRUCTURE IN *STELLARIA*
(CARYOPHYLLACEAE) IN IRAN**

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Stellaria (Caryophyllaceae) composed of 120 species in the world and 7 annual and perennial species in Iran [1]. It is highly distributed in different habitats of Iran. Populations of this plant grow in waste land and fields. Although most species are famous weeds but some species as *S. media* are of edible and medicinal importance [2]. In *stellaria* species there are many morphological similarities which make the identification of species difficult. In order to identify different species it is better to study the species from different point of views. In this project we used qualitative and quantitative anatomical features of stem cross sections. 30 accessions of five species were considered. Stem cross section were handmade and double colored. The aim of this study was to identify the cross section of the stem in order to clarify the species relationships. This was the first project in this field in Iran. Species relationships especially in *S. media*, *S. pallida* and infra-specific level in *S. media* is very complex. Result of present study showed that there were some differences in average number of vascular bundle, presence or absence of sclerenchyma layer, the number of parenchyma layers, the presence or absence of hairs and hairs number, in stem cross section. Our result are in concordant with previous records for same taxa [3].

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**EFFECTS OF HYDROALCOHOLIC EXTRACT OF
PARSTINACA SATIVA SEEDS ON ACTIVITY OF LIVER ENZYMES IN
NORMAL AND STREPTOZOTOCIN INDUCED DIABETIC RATS**

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Diabetes mellitus is the most important metabolic abnormalities around the world. This disease has specific change in intracellular metabolism in many tissues including the liver. This study aimed to assess the effect of *Parstinaca sativa* seeds hydroalcoholic extract on improving liver damage caused by diabetes in normal and diabetic rats in comparison to control drug, Glibenclamid. Serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT) and Alanine transaminase (ALT) levels in serum were studied

Thirty six male Wistar rats were randomly divided to six groups(as Normal control (NC), Diabetic control (DC), diabetic rats treated with plant extract 200mg/Kg (Dt0.2)and 400 mg/Kg (Dt0.4), Normal rats treated with plant extract 200 mg/Kg (Nt0.2),diabetic rats treated with 600µg/Kg Glibenclamide (DG). Diabetes was induced by IP single injection of streptozotocin (60mg/Kg). Rats were treated daily for four weeks. Levels of SGOT, SGPT and ALT were measured at the end of the experiment.

SGOT in *Dt0.2* group was significantly ($p<0.01$) lower than DC group. *Dt0.2* and DG groups showed significant ($p<0.05$) decrease in levels of SGPT than DC group, but *Dt0.4* group has the most significant decrease ($p<0.01$). ALT in DG group was significant ($p<0.05$) decreased compared with DC observed, but seed extract did not decreased ($p>0.05$) ALT levels in all treated groups. No significant differences ($p>0.05$) observed between root extract (in all treated groups) and DG group. *Parstinaca sativa* seeds extract has positive effects on inhibiting liver damage due to diabetes in diabetic rats by decrease in levels of SGOT and SGPT.



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**ASSESSMENT OF SALINITY TOLERANCE IN IRANIAN FENNEL
LANDRACES IN SEED GERMINATION STAGE**

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Medicinal plants are one of the most valuable natural resources of Iran. Today many medicinal plants face extinction or severe genetic diversity. For the most of medicinal plant No conservation work has been done and there are small amount of their genetic resources in gene banks. By the increasing of population, reduction of fresh water and the extension of saline lands it is required to produce resistant plants to this harsh environmental condition. In this regard, Study of the salinity tolerance in medicinal plants is very important for improving of their culture in saline lands.

To investigate the effects of different levels of salinity on seed germination of fennel, 15 accessions from different geographical habitats in Iran were collected. Factorial experiments in complementary randomized block design with 3 replications were done in vitro condition and room temperature. Experiments included 3 levels of salinity (0, 50, 100 mM NaCl) and 15 fennel accessions. After 15 days, percentage of fennel seed germination, their root and shoot length and, fresh and dry weight of shoot, and dry weight of roots were measured. Results showed that by increasing of salinity, the studied traits of accessions significantly declined. Reduction in the amount of fennel accessions was different. The interaction between salinity and genotypes were significant. The experimental results showed that based on dry weight quantity, Accessions of Shiraz, Fozve, and marvdasht were detected as the most tolerant and regarding to seed germination, Sari and Qazvin were the most sensitive accessions.



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**EFFECT OF SEED PRIMING BY SALICYLIC ACID ON
GERMINATION IMPROVEMENT AND SEEDLING GROWTH
PARAMETERS IN GARDEN CRESS (*LEPIDIUM SATIVUM*) UNDER
SALINE CONDITIONS**

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One of the critical stages of plant growth cycle, stages of germination and seedling establishment because it plays a major role in determining the final density of plants. Low seed germination and seedling emergence is one of the main problems in saline areas [1]. Seed priming technique has been known as a cause to improve germination and seedling emergence under different environment stresses [2]. The objective of this study was to evaluate the effectiveness of seed priming in improving seed germination, root and shoot length, root and shoot weight of Garden cress (*Lepidium sativum*), in response to 4 levels of NaCl (0, 50, 100 and 150 μ M) and to 4 levels of priming by Salicylic Acid (0, 500, 1000 and 1500 μ M). An experiment was conducted as factorial based on CRD with three replications in research laboratory of agriculture faculty of Maragheh University. The results showed that root length and shoot length were significantly ($P < 0.01$) decreased by increasing salinity for unprimed seed (control) compared with primed seeds but root weight and shoot weight were non-significantly. Salinity conditions reduced seed germination percent. Non-stress and 150 μ M NaCl Treatment had the maximum (95.3 %) and had the minimum (89.7 %) seed germination percent, respectively. Also in priming by salicylic acid control treatment and 500 μ M had the maximum and the treatment 1000 and 1500 μ M had the minimum seed germination percent. In conclusion seed priming by salicylic acid improved the germination and seedling growth.

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**INVESTIGATION OF DIFFERENT CONCENTRATIONS OF Fe IONS
ON ROSMARINIC ACID BIOSYNTHESIS IN *MELISSA OFFICINALIS***

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Lemon balm (*Melissa officinalis* L.) belong to Lamiaceae family is a well-known medicinal plant mainly due to two groups of compounds; the essential oil and the phenylpropanoid derivatives[1]. The prominent phenolic compound is rosmarinic acid (RA), an ester of caffeic acid and 3,4-dihydroxyphenyllactic acid that possesses various biological activities, such as antibacterial, antiviral, anti-inflammatory, anti-cancer and antioxidant activities[2, 3]. In this research, we assayed the effects of various Fe concentrations (0, 10, 20, 30 and 40 μ M) on rosmarinic acid content at different times intervals (8 and 16 hours) in *M.officinalis* 45-day seedling. The results showed, rosmarinic acid content in all treatments drastically decreased in compared to control sample.

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**ASSESSMENT OF DROUGHT TOLERANCE IN IRANIAN FENNEL
LANDRACES IN SEED GERMINATION STAGE**

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Diversity of climate and ecological conditions caused a vast diversity of medicinal plants across Iran. Assessment of seed germination variation for drought and salinity tolerant are very important factor in breeding programs. Plants differently respond to stress, according to the stages of their growth, development and plant age. Therefore screening of tolerant species and genotypes to salinity and drought is important issue in order to more production and also prevention from growth and performing. In this study the effects of different levels of drought stress on seed germination of Iranian fennels were investigated. 15 populations were collected from different habitats in Iran. Factorial experiments in complementary randomized block design with 3 replications were done in vitro condition and room temperature. The experiment consists of 4 levels (PEG6000)

0, -2, -4, -6, bar. After 15 days, percentage of fennel seed germination, root and shoot length and, fresh and dry weight shoot, and dry weight roots were measured. Results showed that by increasing of drought, the studied traits of accessions significantly declined. Reduction in the amount of accessions' traits was different. The interaction between drought and genotypes were significant. Based on dry weight quantity, Accessions of, Fozve, and Shiraz were detected as the most tolerant and regarding to seed germination Sari and Qazvin were the most sensitive accessions.



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ROLE OF MUCILAGE IN GERMINATION OF MEDICINAL PLANTS

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Germination and early seedling growth are crucial stages in crop establishment, hence determine the final density of plants per unit area. Mucilages are Polysaccharide macromolecules which are soluble in water and in addition to the medical and industrial roles they also play an important ecological and agronomical role in the maintenance of seed germination and vigour. Therefore, to investigate the role of mucilage in germination of medicinal plants, standard germination test conducted on 4 replications of 25 seeds of 14 species of medicinal plants with mucilage from the families of Lamiaceae, Brassicaceae, Fabaceae, Linaceae and Plantaginaceae in petridishes with 9 cm diameter with filter paper premoistened with distilled water in the Seed Laboratory, Faculty of Agriculture, Ferdowsi University of Mashhad in year 1391. Different treatments to break dormancy applied. Results showed that species of *Ocimum basilicum*, *Descurainia Sophia*, *Salvia sclarea*, *Plantago major*, *Lallemantia ibrica* and *Plantago lanceolata* had germination below 80% in distilled water. Removing mucilage increased germination in 6 species except in *salvia sclarea*. Disinfection with sodium hypochloride (1%) and KNO₃ and GA₃ treatments increased germination percentages in the species. Experiments are continuing to investigate the role of mucilage in seed dormancy [1, 2].

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INVESTIGATION OF FLAVONOID CONTENT AND ANTI-OXIDANT ENZYME ACTIVITY IN TREATED *MELISSA OFFICINALIS* SEEDLING WITH Fe IONS

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Lemon balm (*Melissa officinalis* L.) is a perennial herb from the Lamiaceae family[1]. This plant has many beneficial effects such as anti-bacterial, sedative, spasmolytic, mnemonic improvement and could reduce excitability, anxiety, stress, gastrointestinal disorders and sleep disturbance[2]. In this research, we assayed the effects of various Fe concentrations (0, 10, 20, 30 and 40 μ M) on flavonoid content and anti-oxidant enzymes activity at different time intervals (8, 16 and 24 hours) in *M. officinalis* 45-day seedling. The results showed that flavonoid content in the treated seedling decreased significantly in comparison to the control sample. The activities of peroxidase (POD) and superoxide dismutase (SOD) were higher than control but in the case of catalase (CAT) activity, all investigated treatments exhibited lower activity than control sample.

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**STUDY OF SOME CHARACTERISTICS RELATED TO PRIMER
AFTER USING RAPD MARKER IN ORDER TO EVALUATION OF
GENETIC DIVERSITY AMONG *CUMINUM CYMINUM* L.
ACCESSIONS**

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Cuminum cyminum, from the Apiaceae family is an annual plant native of Mediterranean regions. Cumin is a very valuable medicinal plant that is cultivated in huge scale regions such as China and countries located in Middle East [1]. Molecular markers, for evaluation of genetic diversity in plants has shown advantages over other markers based on the phenotype; they are neutral, not related to age and tissue type, not influenced by the environmental condition, feasibility, lower costs and more informative [2]. In this study genetic variation among 42 collected accessions of cumin were assessed based on RAPD (Random Amplified Polymorphism DNA) marker and some primer indices have been calculated such as PIC (polymorphism information content), EMR (effective multiplex ratio), MI (marker index) and RP (Resolving Power) by the average 0.356, 4.059, 1.62 and 7.90, respectively. The PIC value that has been used in many studies in order to evaluate of genetic variation [3] were varied from 0.133 (primer E10) to 0.5 (primer AB1) in this study. The maximum amount of other indices including EMR (11.529), MI (16.66) and RP (19.857) were observed by using primer E17, E17 and U11, respectively. Primer E17 produced highest number of polymorph bonds (14 bonds) so in general we can say higher amounts of mentioned indices are observed by application of primers that produced more DNA bands and more polymorphic bands.

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**THE EVALUATION OF VITAMIN C, ANTHOCYANIN AND
FLAVONOID IN THREE CULTIVARS OF POMEGRANATE IN
MAZANDARAN PROVINCE**

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The pomegranate (*Punica granatum L.*) as one of the oldest edible fruit has a long history as a medicinal fruit and all plant organs of the pomegranate tree have been used to ameliorate an array of common diseases. The phytochemistry and pharmacological actions of pomegranate components suggest a wide range of clinical applications for the treatment and prevention of cancer, as well as other diseases where chronic inflammation is believed to play an essential etiologic role. [1, 2]. This study investigate some secondary metabolites in three varieties native of west of Mazandaran province. The experiment was conducted in completely randomized design under factorial arrangement with three replications. The factors were two harvesting times and three cultivars including Shekar, Shirin and Sangak. Factors such as vitamin C, the content of anthocyanins in juice and skin and total flavonoid of them were examined. The analysis of variance showed that there were highly significant differences (at the 1% level) among the cultivars and between the harvesting times in the skin anthocyanin content, vitamin C and total flavonoids. But the anthocyanins content of juice were significantly different only among the varieties at 1% level. The result showed that the highest rates of skin anthocyanin content were 0.105 µg per g in cultivar Sangak and the first harvest. The highest amount of Vitamin C was 3.065 mg per 100 ml juice corresponds to cultivar Shekar and the second harvest and the highest flavonoid was 4.95mg GAEs per 100 ml crude juice related to cultivar Sangak and the second harvest. The highest level of juice anthocyanin content was 0.265 µg per g in the second harvest.

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**IN VITRO EVALUATING THE EFFECT OF HEAVY METALS ON
GERMINATION AND GROWTH PARAMETERS OF SOME
MEDICINAL PLANTS**

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Heavy metals are naturally present in the environment. Their occurrence, however, has gradually been increasing with the increase of industrialization. Agricultural soils, as an essential part of the environment, are no exception of this phenomenon. Cadmium and lead are considered as the most hazardous heavy metals and the main environmental contaminants. Nickel, at low concentrations, is used by the plants as a micronutrient, but at high concentrations it has toxic effects on vegetal growth. Medicinal and aromatic plants appear to be a good choice for phytoremediation since these species are mainly grown for secondary products (essential oil) thus the contamination of the food chain with heavy metals is eliminated. Aromatic and medicinal plants also have a demonstrated ability to accumulate heavy metals. The aim of this study is investigating the effect of heavy metals (cadmium, nickel and lead) On germination and growth parameters of *Sophora sp.* and *Brassica nigra*. The seeds of *Sophora sp.* and *Brassica nigra* were aseptically cultured on MS medium supplemented with different concentrations of Cd (5-50-250 mg.l⁻¹) and Ni (5-50-250 mg.l⁻¹) and Pb (5-50-250 mg.l⁻¹) on *in vitro* condition. Germination and growth parameters were noted during culture period. Germination of *Brassica nigra* seeds were stopped in both high concentration of Cd (250 mg.l⁻¹) and Ni (250 mg.l⁻¹), but it wasn't occurred in high concentration of Pb (250 mg.l⁻¹), in which smaller plants with fewer leaves and secondary root were observed. In different treatments of heavy metals (cadmium, nickel and lead), Germination and growth indices of *Sophora sp.* were remained well as control. Our results showed that *Sophora sp.* is more tolerant than *Brassica nigra* in high concentration of nickel and cadmium and *in vitro* culture can used as a new method for screening of plants resistant to heavy metals.



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**STUDY THE EFFECT OF SEED PRIMING BY PLANT GROWTH
REGULATORS ON SEED GERMINATION AND SEEDLING GROWTH
CRITERIA IN *MATRICARIA AUREA***

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Currently the use of plant growth regulators has been increased for enhancement of seed germination and seedling growth criteria. In order to investigate effect of seed priming by Salicylic acid and Ascorbic acid as plant growth regulator on seed germination and seedling growth of *Matricaria aurea*, a completely randomized design with three replication was conducted in plant physiology laboratory of science located in university of Mohaghegh Ardabili in year, 2012. Experimental treatments include different concentration (50,100,150 and 200ppm) of Salicylic acid and Ascorbic acid and two seed priming time (24 and 48 hours).

Results indicated that seed priming by 150ppm from Salicylic acid and 50ppm from Ascorbic acid were enhanced seed germination rate and seedling dry weight significantly in comparison to control. Also the best performance for seed germination and seedling growth were obtained by 48hours seed priming.

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**THE EFFECT OF HYDRO ALCOHOLIC EXTRACT OF
GLYCYRRHIZAGLABRA ON SOME ELECTROCARDIOGRAM
PARAMETERS AND ITS INTERACTION WITH NITRIC OXIDE
SYSTEM OF MALE RAT**

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Glycyrrhizaglabra has been traditionally used as a medicinal plant in Iran for treatment someof disease. In this study to determine its mechanisms, the effects of hydro alcoholic extract of *glycyrrhizaglabra* on some electrocardiogram parameters and its interaction with nitric oxide system of male rat was examined by the following procedure: 15 adult male rats of mean weight 220 g were kept in normal condition for one week. Then each rat anaesthetized by IP injection of sodium pentobarbital. Then femoral vein was canulated for drug injection. Electrocardiogram was recorded by limb electrodes linked to AD instrument power lab Bio amplifier. Electrocardiogram was recorded before and after IV injection of 90 mg/kg of *Glycyrrhizaglabra* extract, 5 mg/kg of L-NAME (inhibitor of nitric oxide synthase) and the same volume of its solvent. The result showed a significant increase of RR interval and decrease of R amplitude after injection of *glycyrrhizaglabra* with comparing to control condition. In the present study it can be concluded that *glycyrrhizaglabra* may have a positive chronotropic via NO pathway and negative inotropic effect on the myocardium.



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**THE EFFECT OF *CAMPYLOBACTER JEJUNI* VACCINE AND
EXTRACT OF *ECHINACEA PURPUREA* ON COLONIZATION OF
CAMPYLOBACTER JEJUNI IN GASTROINTESTINAL OF BROILERS**

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Campylobacter jejuni is a zoonotic bacterial pathogen with worldwide distribution. It is estimated that 400 million human infections occur in the world per annum. Chickens which are often heavily colonized with *Campylobacter* without signs of pathology are considered the most important source for human infection. To reduce *C. jejuni* colonization in GI tract of broilers a formalin inactivated, *C. jejuni* whole cell vaccine, with Al₂O₃ as a mucosal adjuvant, was administered orally (gavage) to the chickens. In this experiment, 210 one-day-old male broiler chicks (Ross 308) were randomly assigned to the 7 treatment groups, each with 3 replications of 10 birds in each pen. The treatments include: 1) negative control (no challenge), 2) positive control (bacterial challenged), 3) EP Alcoholic extract administration in drinking water (1/1000 (v/v)), 4) *C. jejuni* vaccination at day 14, 5) *C. jejuni* oral vaccination at day 14 + EP Alcoholic extract in drinking water (1/1000 (v/v)), 6) oral *C. jejuni* vaccination at day one and day 14, 7) two times oral vaccination of *C. jejuni* at days one and 14 +receiving EP Alcoholic extract in drinking water (1/1000 (v/v)). All treatments (except negative control) were challenged at day 21 with *C. jejuni* live suspension (6×10⁷ c.f.u.g). Minimum colonization of *C. jejuni* was seen at two times vaccinations and receiving EP. The maximum colonization of *C. jejuni* was observed at positive control group. According to results of this experiment difference in reduction of *C. jejuni* colonization in GI tract of broilers was significant between the treatments (P≤0.05). Results showed that two times vaccination was more effective in reduction of *C. jejuni* colonization than one time vaccination. Extract of purple coneflower significantly increased *C. jejuni* vaccination effect on reducing intestinal colonization of this bacterium.



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THE EFFECT OF ORGANIC ACID, PROBIOTIC, AND *ECHINACEA PURPUREA* APPLICATION ON *CAMPYLOBACTER JEJUNI* COLONIZATION IN GASTROINTESTINAL OF BROILERS

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Campylobacter Spp. is one of the most important human bacterial pathogens causing diarrhea and other diseases like septicemia, meningitis, and as complications reactive arthritis and Guillain-Barre syndrome. Most human Campylobacteriosis cases are food-borne. Handling or consumption of raw or undercooked poultry meat is regarded as a risk factor for human infection. In order to reduce *C. jejuni* colonization in GI tract of broilers and make chickens less susceptible to colonization, organic acid (Selko- pH), protected organic acid (baby c₄), probiotic (Primalac) and alcoholic extract of *Echinacea purpurea* were used. In this experiment, 210 one-day-old male broiler chicks (Ross 308) assigned to the 7 treatment groups, randomly with 3 replications and 10 birds in each pen. The treatments include: 1) negative control (no challenge) ; 2) positive control (bacterial challenged) ; 3) Organic acid (Selko-pH) in drinking water [1/1000 (v/v)]; 4) Organic acid (Selko-pH) in drinking water for 12 h before slaughter (1/1000 (v/v)) ; 5) Protected organic acid (baby c₄) 2.5/1 gkg⁻¹ mix in the feed 12 h before slaughter; 6) Probiotic (Primalac); 7) EP Alcoholic extract in drinking water (1/1000 (v/v)). All treatments (except for negative control) were challenged on day of 21 with *C. jejuni* live suspension (6×10⁷ c.f.u. g⁻¹) and samples were collected on day of 28 and 42. According to the results, treatments 3, 4, 5, 6 and 7 shown significant difference with control (1 and 2) treatments. In conclusion, the results shown that acidification of feed and water, and also instigation of immune system may be a tool to reduce intestinal colonization of *C. jejuni* in broilers.



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**EFFECT OF RESVARATEROL ON TERATOGENECITY IN
EXPERIMENTAL MODEL OF PREECLAMPSIA IN RAT**

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Preeclampsia is a major cause of maternal and fetal morbidity and mortality. The etiology of this disorder is not clear but it seems that reactive oxygen species production has a critical role in the manifestations and complications of this syndrome [1, 2]. Resveratrol, a constituent of red wine, exhibits a wide range of biological and pharmacological activities including its action as a potent antioxidant [3]. In the present study, the effect of resvaraterol, on some of fetus complications is studied in the experimental model of preeclampsia in rat. Preeclampsia was induced by intrapritoneal (I.P.) administration of L-NAME (100mg/kg/day) from day 11 of pregnancy to day 22. One group of preeclamptic rats received L-NAME alone. Two others received L-NAME with two different doses of resvaraterol (10 and 20 mg/kg/day, i. P.). A group of normal pregnant rats received only solvent of resvaraterol (DMSO). Studied parameters were number and weight of offsprings, oxidative stress (serum and placental Malondialdehyde), malformation (amelia, micromelia and fused digit) and hemorrhage of fetuses. Severity of limb hemorrhage, fused digit and malformation (micromelia) calculated on a scale of 1-4 [4].

L-NAME administration caused placental oxidative stress, weight decrease, hemorrhage and limb defects of fetuses. Resvaraterol at doses of 10 and 20 mg/kg/day significantly decreased serum and placental Malondialdehyde (MDA), fetal teratogenicity, fetal hemorrhage and fetal weight reduction. The number of fetuses did not show significant difference between preeclamptic and control groups. L-NAME-induced preeclampsia can result in decrease of delivery outcome and caused complications on fetuses. Resvaraterol significantly decreased fetal teratogenicity and fetal weight reduction.

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**MICROWAVE AND ULTRASOUND ASSISTED HYDRODISTILLATION OF
ROSEMARY ANTIOXIDANTS AND COMPARISON WITH CONVENTIONAL
HYDRODISTILLATION**

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Rosemary (*rosmarinus officinalis*) is an everlasting herb with evergreen needle-like leaves. It is native to Mediterranean region. Extraction of the valuable antioxidants from rosemary leaves has been extensively studied. Anticarcinogenic and antimicrobial properties of antioxidants have been reported. In this research work, combination of microwave and ultrasound assisted hydrodistillation extraction process has been used to obtain antioxidants from rosemary leaves. Using of water as solvent recognized as the most selective and environmentally preferable technique. The main components of the rosemary antioxidants are rosmarinic acid, caffeic acid, vanillic acid, carnosol and carsonic acid. This green process results in lower environmental impact and energy consumption. In this paper, we present a comparison between, combination of microwave and ultrasound assisted extraction, with hydrodistillation extraction alone. Rosemary leaves sample was collected from parks of Tehran, Iran. The leaves were collected during October and then dried by using conventional method. The leaves were powdered by performing cryogenic grinding under solid carbon dioxide. The grounded leaves were passed through appropriate sieve size. The sizes of the particles were about 500 μm . The whole sample was stored in flask at -10°C until use. Double distilled water was used. Double distilled water was deoxygenated in an ultrasound bath for 10 minutes before its use. The procedure was performed at atmospheric pressures. A kitchen type microwave oven with maximum output power of 900 W was used. A whole glass Clevenger-type apparatus was applied. Ultrasound laboratory bath was used. The amount of 50 g of rosemary leaves were placed in a 500 ml round-bottomed flask. For microwave assisted hydrodistillation, the flask was placed into microwave oven at 900 W for 3 min. For the ultrasound assisted hydrodistillation, the flask was inserted into ultrasound bath for 3 min. Then, the flask was connected to Clevenger, and the total rosemary antioxidants were collected in 10 min. The microwave and ultrasound assisted hydrodistillation was compared with conventional hydrodistillation extraction of rosemary antioxidants. In the hydrodistillation process, the total rosemary antioxidants were collected in 1hr. Our research found that, microwave and ultrasound assisted extraction was over 4 times faster than conventional hydrodistillation extraction.

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ANTIBACTERIAL ACTIVITY OF *SALVIA LIMBATA* ESSENTIAL OIL

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Many of the plants used today were known to the people of ancient cultures throughout the world and they were valued their preservative and medicinal powers. Scientific experiments on the antimicrobial properties of plants and their components have been documented in the late 19th century [1]. Naturally occurring microbial inhibitors recovered from a wide variety of plant origin foods and traditional medicines have a key role in health care worldwide. Thus, obtaining scientific information about the efficacy and safety of the plants natural products is one of the important researcher's goals. Essential oils are volatile natural complex compounds formed by aromatic plants as secondary metabolites. In nature, essential oils play important roles in protecting plants in the form of antibacterial, antiviral and antifungal agents and also as herbivores [2]. This research was conducted to evaluate the *in vivo* antimicrobial activity of the essential oil of *Salvia limbata* leaves. The oil of the plant was tested for its antibacterial activity against 3 gram-positive (*Staphylococcus aureus*, *Staphylococcus epidermidis* and *Bacillus subtilis*) and 5 gram-negative (*Escherichia coli*, *Salmonella typhi*, *Shigella dysantriae*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*) bacterial strains using two test methods: agar disc diffusion [3] and Minimal Inhibitory Concentration (MIC) [4]. The oil showed weak to moderate antibacterial activity against tested microorganisms with maximum inhibition zones and MIC values in the range of 16–40 mm and 250 - >2000 µg/ ml, respectively.

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**NANO CUO AND ZNO APPLICATION AFFECT PHENOLIC
COMPOUNDS PRODUCTION IN LICORICE SEEDLINGS**

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Elicitors are compounds stimulating any type of plant defense. Elicitors also can be used as enhancers of plant-secondary-metabolite synthesis. This study was conducted based on completely randomized design. Licorice seeds were treated by 1 and 10 μM nanoparticles of zinc oxide and copper oxide in the media containing solid agar 0.8% and Hoagland nutrient solution. Three replicates were considered for each treatment and the following biochemical parameters were assessed: The content of flavonoids, total phenolic compounds, anthocyanins, and tannins. Data were compared using one-way analysis of variance and Duncan test. Results showed that Concentration of 10 μM nanozinc oxide and nano copper oxide increase flavonoids content in the seedlings. The content of total phenolic compounds in seedlings treated by 1, 10 μM nano-ZnO and nano copper oxide increased compared to control. The content of anthocyanins was increased by concentrations of 1, 10 μM nano zinc oxide and the 10 μM nano copper oxide. These treatments reduced the content of tannins in licorice seedling. In general, based on the results it seems that nano zinc oxide treatment has more considerable effects on phenolic compounds production in licorice seedlings, rather than nano copper oxide.

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**EVALUATION AND COMPARISON OF ANTI-INFLAMMATORY AND
ANALGESIA EFFECTS OF THREE PLANTS *TANACETUM
PARTHENIUM, ANETHUM GRAVEOLENS L.,
APIUM GRAVEOLENS (CELERY)***

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The earth nature has the therapy for all diseases and medicinal plants have a biological balance due to having active ingredients together with other materials and are used in some dices for reduction pain (anti-pain effect) or detoxify the chemotherapy drugs. Therefore collection and identification of these plants and their active ingredients are essential. Finding medicinal plant and studying their analgesic compounds is very important because most diseases are associated with pain in the joints or around joints and anti-pain medications with side effects are prescription for reduce them. There are Several reports of anti-inflammatory and analgesia effects of *Anethum graveolens L.*, *Tanacetum parthenium*, *Apium graveolens*, *Anthemis nobitis*, *Orange peel and Turpentine oil*, *Olive oil*, *Cinnamon oil* and *Ginger oil* in traditional medicine. Evaluate researches shows, possibly *Limonene* and *Coumarin* in these medicinal plants with oils mentioned above, have analgesic and anti-inflammatory effects, by inhibiting biosynthesis of Prostaglandins in the body. In this regard the paper that is provided is compared and evaluate analgesic and anti-inflammatory effects of *Apium graveolens*, *Anethum graveolens L.*, *Tanacetum parthenium* in the decrease of pain and inflammation in joints and its surrounding. In the present research an attempt has been made with the review of papers and dates of researches to understand the analgesic effect of each plant individually and is compared with each other and plant with the highest effect and dose (dosage) introduced. Therefore the present study, with Comparison charts and tables the results of injection of *Tanacetum parthenium* of leaf of water extracts with 40% moisture and its flower with 44.6% moisture in Researches, each with dose of 10, 25, 50 mg/kg and *Anethum graveolens L.* with dose dosage of 100,200,400,500 mg/kg and *Apium graveolens* with dose dosage 100,200,300,400,500 mg/kg and injection of 0.02 ml formalin 2.5% below the planter skin of rats in similar conditions, the analgesic effect of the plants compared for the best plant identification with the most effect .

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EFFECT OF ORGANIC AND CHEMICAL FERTILIZERS ON YIELD AND ESSENTIAL OIL ON TWO SAVORY (*SATUREJA HORTENSIS* L.) ECOTYPES, UNDER DROUGHT STRESS CONDITION

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The management of organic products using organic fertilizers is one of the most important aspects of sustainable agriculture. In this research the effects of organic fertilizers (cow and chicken manure; 30, 10 ton/ha, respectively) with conventional chemical fertilizers in agriculture (N, P, K; 100, 80, 80 kg/ha, respectively) and their effect on grain yield, biological yield, essential oil yield and percent in two savory ecotypes (Khuzestan and Kerman) under two irrigation regimes (50%, 100% field capacity) was evaluated. The experiment was accomplished in Shahid Bahonar University of Kerman research field in 1391 in two separate split plot design (one with 100% and the other 50% field capacity irrigation). In each split plot design the main factor was manure and the subplot was ecotype. Two experiments were analysed as a combined design. Results showed that essential oil percent was not significant between factors. Essential oil yield was significant in drought stress and manures. The maximum essential oil yield was related to non-stress (100% field capacity) and cow manure. Intraaction between drought stress, manures and ecotypes in biological yield was significant. The maximum yield was related to non-stress and cow manure and Kerman ecotype. Manures and drought had significant interaction for grain yield. The maximum grain yield was related to non-stress and cow manure. Generally, organic fertilizers, especially cow manure, had higher moisture absorption compared with chemical fertilizers and showed higher yield. According to the results, it could be concluded that in water deficiency condition, organic fertilizers could be helpful to overcome the negative effects of drought stress.

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EFFECT OF AQUEOUS AND ETHANOLIC EXTRACTS OF NIGELLA SATIVA SEEDS ON MILK PRODUCTION IN RATS

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Nigella sativa L. (*N. sativa*) is used as a galactagogue in traditional medicine [1-3]. Hence, the effects of aqueous and ethanolic extracts of *N. sativa* seeds on milk production in rats were evaluated. First, LD50 values of the extracts were determined by the Litchfield and Wilcoxon method. The milk production was determined according to the method of Lompo-Ouedraogo et al [4]. Briefly, 30 lactating dams (weighing 250-25 g), at the starting of lactation and suckling four to six pups each, were used. Females were divided into five groups of six animals each. Group 1 received orally saline (control group), and groups 2-5 received orally 0.5 and 1 g/kg of the aqueous and ethanolic extracts. Animals were treated daily at 2:30 PM. The milk production was estimated 23 hours after gavage. Milk production was measured from Day 3 to Day 15 of lactation. Milk yield and dams' weight, and weight gain of pups were calculated every day. During the test time, the pups were weighed daily at 8:30 AM (w1) and then isolated from their mothers for 4 hours. At 12:30 PM, the pups were weighed (w2), returned to their mother, and permitted to feed for 1 hour. They were weighed again (w3) at 1:30 PM. The milk yield 23 hours after gavage was estimated as $w3 - w2$. The daily milk yield was corrected for the loss of weight caused by the metabolic processes in the pups during the suckling period. The value used was $(w2 - w1)/4$. Next, this value was multiplied by the amount of suckling hours per day and added to the daily suckling gain. Every day, gain in pups' weight was measured from w2. The intraperitoneal LD50 values of aqueous and ethanolic extracts of *N. sativa* were 4.23 and 4.9 g/kg, respectively. The aqueous (0.5 g/kg) and ethanolic extracts (1 g/kg) increased milk production significantly ($p < 0.001$), producing about 31.3% and 37.6% more milk than control, respectively. During the study period, the pups gained weight with the aqueous (0.5 g/kg, $p < 0.01$) and ethanolic extracts (1 g/kg, $p < 0.05$). It is concluded that aqueous and ethanolic extracts of *N. sativa* can stimulate milk production in rats.

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STUDY THE EFFECT OF NATURAL COMPOUNDS AND ESSENTIAL OILS OF MEDICINAL PLANTS ON IMPROVING MAINTENANCE OF FRESH CUT CUCUMBER

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Today with increasing demand for fresh cut product to find new strategies to increase useful life this products, without compromising the health of humans and environmental is required. Therefore natural compounds could be appropriate solution for extending useful life of fresh-cut fruits and vegetables. In this study, effect of Gum Arabic with concentrations (100,200, 400) ppm and essential oils of *Thymus vulgaris* and rosemary with concentrations (100, 250, and 500) ppm in a completely randomized design with 10 treatments and three replications was evaluated. Initially fresh cucumber slices were prepared and sprayed separately each of the above solutions then packaged in polyethylene trays (175 ml) and was stored at 4°C. After 8 days different factors such as weight loss, titrable acidity, soluble solids, chlorophyll content, ph and appearance traits were measured and analyzed. The results showed that the samples treated with concentrations 500 ppm essential oils and 200 ppm Gum had the highest chlorophyll content, and lower weight loss than others, titratable acidity increased in all treatments compared to control, tss also showed no significant change compared to control treatments, In terms of appearance, taste and texture, the samples were treated with gum and essential oils were more favorable, none of the treatments showed mildew. In general, results of this study showed that the application of natural compounds of medicinal plants as edible coatings, in addition to improving the quality of fresh cut products, may also help improve of community health.

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**STUDY OF CELL CYCLE CHANGES IN HUMAN PROSTATE CANCER
CELL LINE DU145 AFTER TREATMENT WITH COMBINATION OF
β-GLUCAN AND DOXORUBICIN**

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Chemical therapeutic drugs are used for cancer therapy recently. Doxorubicin is such a drug with several side effects [1]. Some herbal derivatives such as polysaccharides are used to eliminate cancerous cells with lower side effects. Barley β-glucan is a polysaccharide contains such pharmacological effects [2]. In the present study combination of Doxorubicin and β-glucan from barley on prostate cancer cell line DU145 is under investigation. DU145 cells were incubated for 24 hours in media contained deferent concentrations of β-glucan, Doxorubicin and combination of these two compounds. Apoptosis determination in DU145 cells was done with ethidium bromide/ acridine orange (ET/AO) dye and fluorescent microscopy. We also studied DNA content of DU145 cells by flow cytometry of propidium iodide stained cells which showed cell cycle changes of the cells after treatments. Our results demonstrated that deferent concentrations of β-glucan and doxorubicin induce apoptosis in DU145 cells in a dose dependent manner. Combination of effective dose of β-glucan (200μg/ml) with ineffective dose of doxorubicin (5ng/ml) showed significant induction of apoptosis as well. According to these results, we can suggest that combination of β-glucan and doxorubicin causes significant decrease of doxorubicin administrated dose. Therefore, using β-glucan as an herbal derivative in combination with doxorubicin reduces side effect of this chemical drug via decreasing its administrated dose.

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THE EFFECTS OF DIFFERENT TEMPERATURES AND OSMOTIC POTENTIALS ON GERMINATION OF *SCROPHULARIA STRIATA*

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Scrophularia striata belongs to Scrophulariaceae family and naturally grows in the western regions of Iran. Seeds of this species express non-deep physiological dormancy. For dormancy breaking, a combination of 400 ppm of GA₃ for 24 h and moist chilling at 5°C for one week was used. To examine the effects of different temperatures and osmotic potentials on germination of this species a factorial experiment in a completely randomized design (three replications of 50 seeds for each treatment) was used. Two factors including temperature (5, 10, 15, 20, 25, 30 and 35°C) and moisture potential (0, -2, -4, -6 and -8 bar of PEG 6000) were conducted. Seeds of this species expressed non-deep physiological dormancy. Result showed that in all temperatures, germination percentage and rate decreased with an increase in osmotic potential and reached to 0% in -8 bar of PEG. In control seeds (0 bar of PEG 6000) germination percentage was 8% in 5°C and germination percentage and rate increased with an increase in temperature. The highest germination percentage and rate detected in 25°C and total germination percentage reached to 87% in control seeds at this temperature. Germination percentage and rate decreased from 25 to 35°C that in 35°C reached to 20% in control seeds. In conclusion, optimum temperature for this species is 25°C with the highest germination percentage and rate. Moreover, this species can tolerate osmotic potential up to -6 bars.

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**EFFECT OF *MELISSA OFFICINALIS* HYDRO ALCOHOLIC EXTRACT
ON LIVER ENZYMES ALP, AST, ALT IN MICE**

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Melissa officinalis is a plant that have numerous consumptions in medicine. The aim of this study is evaluate the effect of hydro alcoholic extract of *Melissa officinalis* on liver enzymes ALP, AST, ALT in mice. In this experimental study, 40 mice were randomly assigned to five groups of eight mice in each group. The Control group received no drugs, while placebo group received normal saline. The three experimental groups received intrapretoneal injection of 50, 100, 200 mg/kg/2days extract for 20 days. After 10 injection, blood samples were taken from all groups and levels of ALP, AST, ALT was measured (data results in a significant level of $P < 0.05$ was determined). However, AST levels between the experimental group and the control group did not show any significant difference. Hydro alcoholic extract of *Melissa officinalis* in the effective dose reduction of ALT and ALP in 200 doses can be useful in hepatic metabolism.



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**EFFECTS OF ECHINACEA PURPUREA, LEVAMISOLE AND
PROPOLIS ON SERUM BIOCHEMICAL METABOLITES IN
BROILER CHICKS**

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In present experiment, the effect of 0.1% aqueous *Echinacea purpurea*, levamisole (15 ppm), ethanolic extracted propolis (300 ppm) on serum biochemical metabolites in broiler was studied using 200 birds. broilers were randomly assigned into 4 experimental units and 5 replications, each with 10 birds. broilers had free access to water and feed during 42 d of experiment. Experimental groups included control, 0.1% aqueous *Echinacea purpurea*, levamisole (15 ppm) and ethanolic extracted propolis (300 ppm). Serum triglyceride, cholesterol, LDL and HDL were determined in blood samples drawn at the end of experiment using commercial biochemical kits. Results showed that there was significant difference among treated groups for serum cholesterol, LDL and HDL ($P < 0.01$). The highest serum cholesterol and LDL was observed in control group and lowest in *Echinacea purpurea* group and the highest HDL in *Echinacea purpurea* group and lowest in control group.

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**EFFECT OF NANOSILVER PARTICLES ON MEDICINAL PLANT
GERMINATION INDEX OF CUMIN (*CUMINUM CYMINUM*)**

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Cumin (*Cuminum cyminum*) is annual plant with herbaceous stem, specific aroma and suitable in arid areas. This plant containing mineral salts vitamins, oil, carbohydrate, tannin and essence. Cumin has medicinal quality example antibacterial, appetizing. This regard, Effect of nanosilver particles on medicinal plant germination index of Cumin (*Cuminum cyminum*) includes germination percent, radicle length, plumule length and seedling biomass. Experiment was carried out as a completely randomized design with three replications. Treatments were concentration of nanosilver (0, 10, 20, 30, 40, 50 and 60 mg/lit) and zero mg/lit was control. Increasing nanosilver rate application led to increase all characters. The nanosilver rates in 10 and 20 mg/lit had no significant effect, however 30, 40, 50 and 60 mg/lit had significant effect on germination percent, radicle length, plumule length and seedling biomass. Treatments of 0, 10, 20, 30, 40, 50 and 60 mg/lit nonosilver increase 2.43, 4.87, 9.75, 12.19, 17.07 and 14.63 percent of germination percent, 3.25, 6.07, 13.66, 15.40, 18.65 and 17.35 percent of radicle length, 1.22, 2.75, 7.64, 11.31, 18.34 and 14.37 percent of plumule length and 1.13, 1.88, 7.92, 19.62, 26.03 and 24.15 percent of seedling biomass comparison with control, respectively [1- 4].

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**EFFECT OF PHYTOBIOTIC COLLECTED BY HONEY BEE ON
INTESTINE MORPHOLOGY IN BROILER CHICKS**

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The present study was designed to investigate the effect of ethanolic extract of propolis on intestine morphology in broiler chickens. A total of 200 day-old broiler chicks were randomly assigned to five replicate pens (10 chicks each) of each of four experimental diets. Dietary treatments were included a (not-supplemented) control diet, diets containing 150 (p1), 300 (p2), 450 ppm (p3) ethanolic extract of propolis. At d 42 of age, one randomly-selected chicks from each pen were slaughtered to evaluate alterations in duodenal, jejunal and ileal epithelial cells. Dietary supplementation with propolis increased villus height in jejunum ($P<0.01$), crypt depth in duodenum, jejunum ($P<0.05$) and ileum ($P<0.01$), the villus height: crypt depth ratio in jejunum in p3 groups ($P<0.01$) and increased in the number of goblet cells in duodenum ($P<0.01$) and ileum ($P<0.05$). The present findings suggest that levels of dietary propolis could improve gut health in broiler chicks.

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**THE EFFECT OF INFORMATION AND COMMUNICATION
TECHNOLOGIES (ICT) AND TECHNOLOGY ON SUSTAINABLE
AGRICULTURE**

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Increasing soil erosion, desertification, forest and environment destruction, natural sources deterioration and etc show that in recent century, we encounter with many challenges and problems in connection of nutrition and food security for increasing population and create sustainable development. Use of information and communication technologies can enhance income, education, hygiene and rural people empowerment. Studying about advantages, limitations, obstacles of information and communication technologies utilization in agricultural and rural development and recognition them; can enhance our insight and vision in this connection and help us in development of appropriate program. Use of appropriate technology also accelerates and facilitates process of sustainable agricultural development. Types of agronomic and animal, chemical and biological technologies such as integrated pest management, integrated weed management, integrated nutrient management, soil conservation practices, breeding of plants and animals, graphical information system, agricultural machines and etc could use in this process [1- 3].

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**ANALYSIS OF THE EFFECT OF DIFFERENT CONCENTRATIONS OF
FE ION ON THE BIOSYNTHESIS PATHWAY OF SULFORAPHANE IN
LEPIDIUM DRABA SEEDLINGS**

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Lepidium draba is a member of Brassicaceae family [1]. This weed contains two significant glucosinolates: glucoraphanin and glucosinalbin [2]. Glucoraphanin is hydrolyzed by myrosinase to sulforaphane which has a lot of health benefits. In this research, we assay the effect of Fe ions on the amount of sulforaphane. White-top seedlings were treated by different concentrations of Fe (0, 1, 5, 10, 20 and 40 mgL⁻¹) for 8 hours. Then the sulforaphane amount was measured by High Performance Liquid Chromatography (HPLC). The data showed that the sulforaphane content at low concentrations of Fe was significantly elevated than the other concentrations. This increase is caused by the effect of Fe on the biosynthesis pathway of glucoraphanin to sulforaphane.

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ISOLATION AND DETERMINATION OF SULFORAPHANE FROM
LEPIDIUM DRABA

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Sulforaphane, a naturally occurring isothiocyanate, is a compound derived from brassicaceae plants such as broccoli, white-top and radish[1]. Sulforaphane displays anticarcinogenic[2] and antibacterial activities[3]. White-top (*Lepidiumdraba*) is a perennial weed that due to having sulforaphane is a valuable medicinal plant[4]. In the present study, all parts of a mature plant were collected from Kerman city and then the amount of sulforaphane in each part was measured by High Performance Liquid Chromatography (HPLC). The data showed that fruits have the maximum amount, followed by flowers, leaves and roots.

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**BIOMASS AND ESSENTIAL OIL CONTENT OF SPEARMINT
(*MENTHA SPICATA* L.) HARVESTED IN DIFFERENT MONTHS IN
SEMI TROPICAL CLIMATE**

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Spearmint (*Menthaspicata*) is cultivated in Khoozestan province that used as fresh vegetable. A tea made from the leaves has traditionally been used in the treatment of fevers, headaches, digestive, disorders and various minor ailments. The herb is also antiemetic, antispasmodic, carminative, diuretic, restorative, stimulant and stomachic. To evaluate essential oil fluctuations, a field experiment was conducted in the two farms of Shoshtar and Hamidieh cities during 2011-2012. Plants were harvested in first days of each month, and then fresh and dry weights of plants were measured. After drying in shade and room temperature, essential oil extraction was made by Clevenger apparatus for 3 h. Results showed that essential oil content was significantly changed during different month for both Shoshtar and Hamidieh samples. The highest essential oil content was observed on July and September for Shoshtar (3.82%) and Hamidieh (2.75%) samples, respectively. The essential oil content of both samples was lowest (0.32% and 0.2%) on February. However, Shoshtar plants had more essential oil content than Hamidieh plants while total dry weight was higher for Hamidieh than Shoshtar samples.

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THE EFFECT OF MEDICINAL PLANTS ON REPRODUCTIVE
PARAMETERS OF *TETRANYCHUS URTICAE* KHOCH
(ACARI: TETRANYCHIDAE)

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Two-spotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae) is an extremely polyphagous pest that has been reported from more than 900 host plant species. It is one of the important pests on agricultural, ornamentals plants, horticultural crops and medicinal plants in the world. Its reproductive parameters were evaluated on ten medicinal plants including coriander, *Coriandrum sativum* L., mint, *Mentha spicata* L., tarragon, *Artemisia dracunculula* L., basil, *Ocimum basilicum* L., onion, *Allium cepa* L., garlic, *Allium sativum* L. fenugreek, *Trigonella foenum-graecum* L., parsley, *Petroselinum crispum* L., cress, *Lepidium sativum* L. and leek, *Allium porrum* L. under laboratory conditions, 25 ± 1 ° C, 65 ± 5 % RH and 16L: 8D in growth chamber. Two-spotted mite failed to survive and complete its development time on basil, onion, fenugreek, garlic and leek. The results showed significant differences in the reproduction characteristics of *T. urticae* on the other five medicinal host plants. The number of total eggs laid per female were affected by host plants and the highest and lowest values were observed on mint (45.6 ± 7.5 eggs) and cress (14.4 ± 2.4 eggs), respectively. The highest number of daily eggs per female was recorded on coriander (4.8 ± 0.4 eggs) and the lowest value was on cress (1.8 ± 0.3 eggs). The longest and shortest adult female longevity were on mint (10.1 ± 0.1 days) and tarragon (6.5 ± 0.6 days), respectively. The pre-oviposition and oviposition periods were affected by medicinal plants, however, no significant difference was observed in the post-oviposition period between tested plants. The result showed that multiple medicinal plants have differential and significant effects on survival and reproduction characteristics of *T. urticae* [1, 2].

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THE EFFECT OF SALT STRESS ON *ALOE VERA*

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Aloe vera is a valuable medicinal plant that cultivated by the means of industry, medicine and food needs. *Aloe vera* can tolerates some extent of salinity so cultivates in the areas with saline soil or water. In this investigation, with the main of the study of salinity on the growth parameters and salt tolerance mechanism of *Aloe vera*, 7-11 leaves old plants were treated with 0,100,200,300 mMol concentrations of NaCl. As a result by increasing salinity level, fresh and dry weight and length of the new shoots were decreased whereas electrolyte leakage and prolin content were increased. the relative water content was higher than control. So we concluded that *Aloe vera* by increasing compatible metabolites and absorption of water tolerates salinity and salt stress has a negative effect on the growth parameters of *Aloe vera*.

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**EFFECT OF NITROGEN DIFFERENT LEVELS ON YIELD AND
MUCILAGE CONTENT OF ISABGOL (*PLANTAGO OVATA L.*)**

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Isabgol (*Plantago ovata* L.) is largely used in pharmaceutical industry, food preparations, ayurvedic medicine, remedies and preparation of crude drugs. In order to study the impact of different nitrogen amounts on quantitative and qualitative yield of isabgol, an experiment was conducted based on randomized completed block design with three replications, at the Agricultural Research Station, College of Agriculture, Ferdowsi University of Mashhad, during growing season of 2011-2012. Treatments included four levels of nitrogen fertilizer (zero (N₀), 25 (N₂₅), 50 (N₅₀) and 75 (N₇₅) kg.ha⁻¹). Plant height, biological yield, seed yield and mucilage content of isabgol were measured accordingly. The results indicated that the different amounts of nitrogen had significant effects ($p \leq 0.05$) on all studied traits of isabgol. By increasing in nitrogen application improved plant height, biological yield and seed yield and declined mucilage content of isabgol. The highest and the lowest seed yield were observed in N₇₅ and control with 506.0 and 475.8 kg.ha⁻¹, respectively.

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**CHANGES IN ESSENTIAL OIL CONTENT OF MYRTLE MYRTLE
(*MYRTUS COMMUNIS*) DURING DIFFERENT MONTHS OF YEAR IN
AHVAZ CONDITION**

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Myrtle (*Myrtus communis*) is an important plant in pharmaceutical industry that formulated various drug from essential oil. In recent years, researchers have focused on this plant species owing to increasing interest in the cultural and economic aspects of aromatic and medicinal plants. The essential oil content and composition of plants are affected by environmental condition, physiological stages, geographical factor, harvest time and postharvest condition as well as genetic factor. In some species, the essential oil content also changes with the time of year, and thus the right time of harvest may be of major importance from an agronomic and economic point of view. In this study, aerial parts of myrtle were harvested at twelve months during 2011-2012 from plants cultivated at research farm of Shahid Chamran university of Ahvaz. The samples were dried in shade and room temperature. Result showed that there is significant difference between months in term essential oil content. The essential oil content was low in early spring and reached to maximum value (1.73%) on June, then showed a decrease during summer months; after that, an increase was observed and decreased again during winter months. The lowest amount was recorded on early March.

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EVALUATION OF QUALITATIVE AND QUANTITATIVE YIELD OF ISABGOL AFFECTED BY DIFFERENT VERMICOMPOST LEVELS

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Application of organic matters is one of the most important strategies for plant nutrition compared to chemical fertilizers, especially in organic management of medicinal plants. Isabgol (*Plantago ovata* L.) is an effective ingredient to lower cholesterol and reduce the risk of heart disease. In order to study the impact of different vermicompost (VC) levels on biological and seed yield and mucilage content of isabgol, a field experiment was conducted based on randomized completed block design with three replications at the Agricultural Research Station, College of Agriculture, Ferdowsi University of Mashhad, during growing season of 2011-2012. Treatments included four levels of VC (zero (VC₀), 2 (VC₂), 4 (VC₄) and 6 (C₆) t.ha⁻¹). Studied characteristics of isabgol were number of spike per plant, biological yield, seed yield and mucilage content. The results indicated that the effects of different levels of VC were significant ($p \leq 0.05$) on all studied traits of isabgol. With increasing in VC level enhanced number of spike per plant, biological yield, seed yield and mucilage content of isabgol. The highest and the lowest number of spike were observed in VC₆ and VC₀ with 10.7 and 8.5 spikes.plant⁻¹, respectively. With enhancing in VC level from zero to 6 t.ha⁻¹ improved mucilage content up to 30%.

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**OPTIMIZATION OF ATROPINE EXTRACTION PROCESS FROM
ATROPA BELLADONNA BY MODIFIED BUBBLE COLUMN
EXTRACTION WITH ULTRASONIC BATH (BCE-UB) METHOD**

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Tropane alkaloids are a class of alkaloids and secondary metabolites which are commonly found in plants of four families, namely, Solanaceae, Erythroxylaceae, Proteaceae and Convolvulaceae. From a pharmacological point of view, tropane alkaloids show antimuscarinic activities. *Atropa belladonna* belongs to the Solanaceae family and may be a good source of tropane alkaloids especially atropine. Atropine results from racemization of hyoscyamine during the extraction process. Many extraction methods including supercritical fluid extraction, microwave-assisted extraction, pressurized solvent extraction, and solid-phase microextraction were reported to extract atropine from solanaceae plants.

In this paper we introduced a new method that is modified bubble column extraction with ultrasonic bath (BCE-UB) was used to extract atropine from stem and leaves of *Atropa belladonna* [1]. UV-visible spectroscopy was used for quantitative analysis of atropine, based on the Chloranilic acid–Atropine Complexometry. Several parameters including extraction time, liquor to material ratio, air flow, extraction solvent, and particle size of samples was considered, and among them the three first parameters were optimized using uniform experimental design (UD) [2]. Optimum condition were that kamada solvent (i.e. chloroform-methanol-ammonia) with the ratio of 15:15:1(v/v/v) as extraction solvent with a particle size of less than 350 μm . Also, extraction time, liquor to material ratio and an air flow will be determined based on the uniform experimental design method.

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**EFFECT OF SALICYLIC ACID ON QUALITY AND ESSENTIAL OIL
COMPONENTS OF MOLDAVIAN BALM
(*DRACOCEPHALUM MOLDAVICA* L.)**

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Moldavian balm (*Dracococephalum moldavica* L.) is annual herb plant belonging to the Lamiaceae family. The essential oil of Moldavian balm is considered stomachic and sedative. Essential oil of this plant is used in pharmaceutical and food industries and possesses antimicrobial feature. Salicylic acid (SA) is a phenolic phytohormone and is found in plants with roles in plant growth and development, photosynthesis, transpiration, ion uptake and transport. In order to evaluate the effect of salicylic acid on the essential oil components of this plant, an experiment was conducted with the use of this hormone in a completely randomized design with five treatments (SA concentrations at 0, 10^{-2} , 10^{-3} , 10^{-4} and 10^{-5} molar) and with three replicates. Seeds were planted in a light loam soil and about two weeks before flowering, treatments were performed. Plants were harvested at flowering stage and after drying; their essential oil was extracted by cleveger. Its essential oil was analyzed by GC/MS. The results of this research showed that salicylic acid has significant effect on the essential oil components. The SA application concentration of 10^{-3} will increase E-citral (24.69%-31.95%), Z-citral (20.70%-23.49%) and also the concentration of 10^{-4} will increase the Geraniol (23.50%-27.20%).



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**THE STUDY OF TWO ECOTYPES OF GERMAN CHAMOMILE
(*MATRICARIA CHAMOMILA*) IN CLIMATIC CONDITION OF AHVAZ**

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German chamomile (*Matricaria chamomilla* L.) is one of the most important medicinal and aromatic plants of both traditional and modern systems of medicine. It is native of Europe and adjoining Asian countries. Chamomile is growing spontaneously in almost part of Iran. In this study, the seeds of two ecotypes of chamomile (Iranian and Italian) were cultivated in Ahvaz climatic condition. Growth indices such as anthodia diameter, fresh and dry weight of flower, shoots and root, flower number, plant height and axillary shoot number were measured during the flowering period. Essential oil was extracted from flower harvested at 6:00, 12:00 and 18:00 h by Clevenger apparatus. Results showed that all growth parameters were significantly higher in Italian ecotype than Iranian ecotype. The highest and lowest essential oil content was obtained from flower at 12:00 and 18:00 h, respectively. In overall, Italian ecotype was recommended for cultivation in Ahvaz condition.

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**STUDY OF SEED AND BIOLOGICAL YIELD AND MUCILAGE
CONTENT OF ISABGOL AFFECTED BY DIFFERENT COW MANURE
AMOUNTS**

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Isabgol (*Plantago ovata* L.) is an annual medicinal plant that the dried seeds and its husks are demulcent, emollient and laxative. In order to evaluate the effect of different cow manure levels on yield and mucilage content of isabgol, a field experiment was performed based on randomized completed block design with three replications at the Agricultural Research Station, College of Agriculture, Ferdowsi University of Mashhad, during growing season of 2011-2012. Treatments included four levels of cow manure (zero (C₀), 5 (C₅), 10 (C₁₀) and 15 (C₁₅) t.ha⁻¹). Spike length, biological yield, seed yield, and mucilage content of isabgol were measured accordingly. The results showed that the different amounts of cow manure had significant impact ($p \leq 0.05$) on spike length, biological yield, seed yield and mucilage content of isabgol. The maximum seed yield was observed in C₁₅ with 539.3 kg.ha⁻¹ and the minimum was for C₀ with 475.8 kg.ha⁻¹. By increasing in cow manure level from zero to 15 t.ha⁻¹ enhanced mucilage content of isabgol up to 19%.

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**EFFECT OF ARBUSCULARMYCORRHIZA ON CONTENT OF
ESSENTIAL OILS IN MINT**

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Major components in mint family (Lamiaceae), including spearmint, are essential oils. Spearmint is due to the important of plant economic and pharmaceutical researchers to attract more attention. About 80% of all terrestrial plants form associations with arbuscular mycorrhizal fungi (AMF) (1,2). Mint plants were propagated from rhizomes and stem cuttings in pots containing vermiculite/sand (50:50) and were grown under controlled conditions in green house. In this study, two species of arbuscular mycorrhiza *Glomus mosseae* and *G. etunicatum* were used to assess the effects of inoculations on content of essential oils in three population of mint (Meybod, Kashan and Bojnourd). Essential oils from spearmint sample were isolated by water distillation (Clevenger). After successful inoculation increase the content of essential oils were measured in leaf of mint.

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PHYLOGENY OF *TANACETUM* L. SECT. *XANTHOGLOSSA* BASED
ON CPDNA NDHF-RPL32 SPACER SEQUENCES DATA

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The genus *Tanacetum* L. with around 160 species is the third largest genus of the Compositae–Anthemideae, subtribe Anthemidinae. *Tanacetum* species containing a variety of secondary metabolites are of aromatic plants and have numerous medicinal and herbicide attributes. The section *Xanthoglossa* containing about 16 species and subspecies, 7 of which are considered as members of species complex *T. polycephalum*, is one of the most taxonomic problematic sections within the genus. In the previous studies, based on nrDNA ITS and cpDNA *trnH-psbA* sequences data, phylogenetic relationships among the representatives of this section remained unresolved and these taxa were not gathered in a well supported clade [1]. In the present study the newly introduced cpDNA molecular marker with high rate of variability, *ndhF-rpL32* spacer [2] was used to answer the evolutionary and phylogenetic questions at low taxonomic levels, within the section *Xanthoglossa*. This marker is located in the small single copy (SSC) of cpDNA. The sequences were analyzed using Maximum Parsimony and model based method, Bayesian. The length of the aligned sequences of the studied species was 1037 bp. The nucleotide T, C, A and G percentages were 37.2%, 11.3%, 38.8% and 12.8% respectively. MP analysis resulted in 8 trees with equal shortest length of 49 steps, Consistency Index (CI) of 0.63 and Retention Index (RI) of 0.75. Based on the *ndhF-rpL32* spacer sequences data the phylogenetic relationships between different species of this section such as *T. polycephalum*, *T. chiliophyllum*, *T. sonbolii* and *T. elborsense* are well resolved with high statistical support values.

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**A NEW METHOD BASED ON THE UV-VISIBLE SPECTROSCOPY FOR
QUANTITATIVE ANALYSIS OF ATROPINE IN BIOLOGICAL
EXTRACTS**

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Several methods for atropine tropane alkaloids analysis have been reported in the literature such as gas chromatography (GC), liquid chromatography (LC), and capillary electrophoresis (CE). A new method, namely, a double standard-analyte addition method using UV-visible spectroscopy based on the chloranilic acid-atropine complexometry, was designed for quantitative analysis of atropine in biological extracts [1]. Indeed, the advantage of the standard addition method than other methods is to apply it for unknown solution matrix. However, this standard method cannot be used for the cases that the other unknown samples participate in the total absorption. This defect has been resolved in the new method which we have used in this work. In the new method, analysis of atropine in biological extracts was performed by UV-visible complexometry of the atropine-chloranilic acid complexes at $\lambda_{\text{max}} = 535$ nm in chloroform-dioxane mixed medium [2]. The comparison of this new method and the liquid chromatography (LC) method confirmed the performance of this method.

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INHIBITORY EFFECT OF *HELICHRYSUM ARENARIUM L* ESSENTIAL OIL ON GROWTH OF FOOD CONTAMINATED FUNGAL

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Essential oils are liquid, volatile, natural, limpid and rarely colored, lipid soluble and formed by aromatic plants as secondary metabolites [1]. Essential oils have been used in many cases because of their natural properties such as antifungal, antibacterial and insecticidal activities. An estimated 3000 Essential oils are known, of which about 300 are commercially important especially for the pharmaceutical, agronomic, food, sanitary, cosmetic and perfume industries [1, 2].

In this study the antifungal effect of *Helichrysum arenarium L* essential oil was studied in in vitro condition on growth of two fungi species *Aspergillus flavus* and *Aspergillus parasiticus* in method of microdilution and at ten different concentrations (25000, 12500, 6250, 3125, 1562.5, 781.25, 390.625, 195.31, 97.65 and 48.82 µg/ml). Minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) of this oil was determined and also the most sensitive of them to essential oil of these plants was investigated. Results of these research showed that MIC value for both fungal is the same (48.82 µg/ml) but sensitivity of *Aspergillus parasiticus* with MFC value of 390.625 µg/ml is more than *Aspergillus flavus* (6250 µg/ml). The results of this study showed that essential oil of *Helichrysum arenarium L* have significant antifungal activity so this plant can be used as antifungal agent in food and medicinal industries.

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MARKETING THE MEDICINAL PLANTS PRODUCTS BASED ON ITS QUALITIES

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Medicinal plant quality is the interaction of plant physiological responses to environmental factors such as nutrition and stress conditions. Herbal Products manufacturers and operators generally the result of their labor traditionally offered to shopping center sand based on agreed price, the proceeds will benefit the economy. Due to the great expenditure for education and promotional organizations to developing the technical knowledge of producers, it is expected the quality of the products increase by using the scientific methods to raise the quality of the yield.

The existing experiences in marketing the agricultural and animal husbandry products based on their quality shows the medicinal plant products can be performed based on their quality from the producers too. The latest and the newest pattern in this case in Iran is related to a national plan for buying the wheat product based on its qualities in 2004 were executed in 9 provinces in Iran. This paper is going to show the new system of medicinal plant product and sell it in Iran can execute and improve by Pricing, based on the quality to save the investment. In this pattern by defining the natural and external quality and also the precise indexes explaining, measuring the quality of product can be possible. Finally based on definition of products qualities; producers can achieve a good price for their goods.

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ANTIFUNGAL ACTIVITY OF ESSENTIAL OIL OF *ZIZIPHORA CLINOPODIOIDES L*

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There are 4000 plant species in lamiaceae family that placed in 200 genres [4]. *Ziziphora clinopodioides L* is one of the most important plant in these family that growth wildly in the eastern parts of Iran [3]. In Iranian folk medicine, *Ziziphora* species have been used for various purposes such as sedative, stomachache heart disorders, common cold, inflammation, depression, diarrhea, expectorant, coughing, antiseptic, migraine, fever and carminative [1, 2, 4]. In Iranian folklore, the dried aerial parts of aforementioned species have been frequently used as culinary and spice in food [3].

In this study the antifungal effect of *Ziziphora clinopodioides L* essential oil was studied in invitro condition on growth of two yeasts species *Saccharomyces cerevisiae* and *Candida albicans* in method of microdilution and at ten different concentrations (25000, 12500, 6250, 3125, 1562.5, 781.25, 390.625, 195.31, 97.65 and 48.82 µg/ml). Minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) of this oil was determined and also the most sensitive of yeast to essential oil of this plant was investigated. Results of these research showed that sensitivity of *Saccharomyces cerevisiae* with MFC value of 97.65 µg/ml to these essential oil is more than *Candida albicans*. The results of this study showed that essential oil of *Z. clinopodioides* have significant antifungal activity so this plant can be used as antifungal agent in food and medicinal industries.

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**LIQUORIC TRITERPENOID TRANSPORT VIA CACO-2 CELLS
MONOLAYER**

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The roots of liquoric contains mixture of triterpens, the most abundant is glycyrrhetic acid (GA). Glycyrrhetic acid and its metabolites including a- and b-glycyrrhetic acid are used in pharmaceutical and cosmetic products [1]. Due to having anti-inflammatory, anti-ulcer and anti-allergic activities, GA and its metabolites are used in some confectionary materials such as candies too [2]. In this study we aimed to investigate the rate of proposed triterpens transport via Caco-2 cells monolayer as the closest model to human intestinal epithelium. The Caco-2 cells were cultured in DMEM cell culture medium supplemented with 10% FCS and remained in 95% humidified air and 5% CO₂ at 37 °C. Caco-2 cells were grown on 0.3 cm² high pore density polyethylene terephthalate membrane trans-well inserts with 0.4 μm pores placed in a 24-well plate. The cells were seeded at a density of 0.3 × 10⁵ cells/insert and the medium was refreshed every 2- 3 days. The integrity of cellular monolayer after culturing for 17-19 days was evaluated by measuring Trans epithelial electrical resistance (TEER) using a Millicell-ERS Volt-ohmmeter. The transport of the proposed triterpens from apical side to basolateral side was performed. Only α-GA at high concentration (100 mM) could reduce significantly (P<0.05) the trans epithelial electrical resistance. Transport studies which were conducted by using impermeable molecule of Lucifer yellow, indicated that Caco-2 cells monolayer was tight connected. The test compounds transport assessment via Caco-2 cells monolayer showed that GA was not able to transfer from apical side to basolateral side, while other two metabolites in a concentration-dependent manner were transferred. Our data suggest that despite of GA, its active metabolites which readily could be obtained from GA by acidic hydrolyze, are able to pass via the epithelial cells. Moreover, the biological activity of GA might attribute to its active metabolites that capable to reach the systemic circulation.

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**PHYLOGENETIC RELATIONSHIPS OF SOME SPINY *ASTRAGALUS*
(*ASTRAGALUS*, FABACEAE) USING nrDNAITS SEQUENCES**

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Astragalus L. (Fabaceae) as the largest genus of vascular plants on earth contains an estimated number 2500-3000 annual and perennial species and 245 taxonomic sections [3]. Spiny *Astragalus* a large group in the genus, characterized by the thorny cushion forming habit, existence of gum ducts, reduced pods and inflorescence size and unilocular fruits with 1-2 seeds. Special gum ducts in these plants make them popular medicinal herbs. Relationships between Spiny *Astragalus* species as one of the most difficult groups remained unresolved [1, 2]. The nrDNAITS marker has been used to investigate the phylogenetic relationships of spiny *Astragalus* sections, delimitation of sections and given a correct classification. In this study, nrDNAITS sequence data for 42 taxa, contains 13 relative sections was amplified using appropriate primers by PCR and automated DNA sequencing in the cycle sequencing reaction. In the next step the sequences were aligned with ClustalX program and followed by manual adjustment. Our data have been analyzed with PAUP*, MrBayes and raxmlGUI softwares. The length of nrDNAITS in these taxa is ranging from 603 to 605 characters and 71 characters are potentially parsimony informative. The results of the analysis revealed that 10 analyzed sections were not monophyletic and its species has been intermixed with each other; and thus the delimitation of these sections is artificial. Only sections *Rhacophorus* and *Acanthophaea* each with three representatives is monophyletic. The section *Aegacantha* which has some similar characteristics with spiny *Astragalus* is nested in the non-spiny section *Caprini* out of the spiny *Astragalus* clade.

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**SILYMARIN DOWN REGULATED THE VARICOCELE-INDUCED
PROTEIN OXIDATION AND E2f1 EXXPRESSION IN THE TETIS**

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The exact pathogenesis for varicocele has not been fully identified yet. Nevertheless, elevated testicular temperature, severe hypoxia by venous stasis and small vessel occlusion, damaged leydig cells, remarkable reduction in testosterone level, and androgen receptor defects have been reported as possible causes [1, 2]. In this study we aimed to clarify the protein oxidation and E2f1 expression pattern in varicocele-induced animals and consequently evaluate the protective effect of silymarin (SMN) on varicocele-induced damages in testis. Wistar rats were divided into three groups including; control-sham, varicocele-induced (VCL) and SMN-treated varicocele-induced rats (50mg/kg, orally). The sperm quality (viability and motility, total count), protein carbonylation rate and E2f1 expression in the testis were assessed. Silymarin remarkably reversed the VCL-reduced sperm parameters including sperm viability and motility. The rate of protein oxidation was significantly increased in the VCL-group compared with the control-sham group (0.65 ± 0.05 vs 0.13 ± 0.02 nmol/mg of protein), while SMN was able to decline the carbonylation of the protein in the testis of varicocele-induced rats (0.09 ± 0.03 nmol/mg of protein). SMN treatment resulted in a significant ($P < 0.05$) down-regulation of the VCL-up-regulated E2f1 at mRNA level. Our data suggest that in addition of sperm quality, the testis structure also is affected by varicocele. Moreover, the protective effects of SMN on varicocele-induced damages might attribute to its antioxidant property and may be mediated via E2f1 transcription factor regulation.

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**POLLEN MORPHOLOGY OF SOME SILENE SPECIES OF
LASIOSTEMONES SECTION IN IRAN**

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Silene L. (Caryophyllaceae) is a large genus with 700 species in the world. Main center of biological diversity of this genus is south west Asia and southern parts of Balkan. Species delimitation and species number in this genus is uncertain. Some silene species are of medicinal importance in Chinese traditional pharmacy. Silene root tea is used in worm removal. Some silene species has antimicrobial effects (Erturk, 2006). Arora and Pandey (1996) and Bakhshi (1984) recorded some medicinal importance for some *Silene* species in this project six species of *Silene* Section *Lasiostemones* have been studied for their Pollen morphology in Iran as: *S. tenella*, *S. marschallii*, *S. longipetala*, *S. claviformis*, *S. ruprechtii* *S. propinqua* by light and Scanning electron microscopic. This is the first pollen morphology study of these taxa in Iran. Pollens are monad, spheroid and poly pantoporate. By studying 19 qualitative and quantitative features were evaluated. These features were of diagnostic importance. Statistical analysis by SPSS software revealed clustering which show the similarities between *S. propinqua* and *S. ruprechtii*. Species pairs as *S. marschallii* and *S. tenella* and *S. claviformis* and *S. longipetala* were also very similar to each other. Results of present study have been discussed.

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**EFFECT OF DIFFERENT CULTIVARS ON NARINGIN AND
HESPERIDIN FLAVONOIDES CONTENTS IN DIFFERENT FRUIT
PARTS ON *CITRUS AURANTIUM* ROOTSTOCK**

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Citrus bio-flavonoids play an important role in the pharmaceutical industry; in the way which Naringin has an effect in reducing blood cholesterol and Hesperidin in curing varices. The purpose of this research was the study of Naringin and Hesperidin contents in different fruit parts (epicarp, mesocarp and endocarp) of Minneola tangelo and Valencia grafted on the sour orange (*Citrus aurantium*). The experimental design was conducted at the citrus research institute, Kotra, Tonekabon and Gorgan faculty of plant production. A complete randomized design with a split-plot arrangement including three replications was used. In this investigation, fresh weight, dry matter, total extract, Naringin and Hesperidin contents were measured in Minneola tangelo and Valencia. The Extraction of total extract was done by hexane and measurement of Naringin and Hesperidin used by high performance liquid chromatography (HPLC). The result showed the different cultivar had significant effects on fresh weight, dry matter, total extract and Naringin content of the mentioned parameters but had not significant effect on Hesperidine content. Based on Duncan mean test the highest total extract (0.765 ppm) was recorded in mesocarp of Minneola tangelo fruit. The greatest Naringin content (2.055 ppm) was produced on endocarp of Minneola tangelo while the highest Hesperidin content (0.500 ppm) was recorded in mesocarp of Valencia fruit [1,2].

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**A STUDY ON TOTAL CHLOROPHYLL CONTENT IN LEAVES OF
DAUCUS CAROTA L. GROWN IN TWO PROVINCES OF IRAN AND ITS
CORRELATION WITH SOME METEOROLOGICAL PARAMETERS
AND CAROTENOIDS LEVELS**

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Chlorophylls are essential pigments in chloroplast and have vital role for photosynthesis. The chlorophyll content in plants can be affected by plant type, carotenoids amount and environmental and also weather factors. *Daucus carota* (Apiaceae) is globally important plant which contains valuable nutritional compounds such as carotenes and extensively cultivated in southern and central provinces of Iran. Our previous studies in carrot showed that carrot from southern regions of Iran have much more carotenoids compared to the other regions. Additionally, meteorologically differences in carrot growing places may affect chlorophyll content and little is known on association between the changes in chlorophylls content in carrots of Iran with meteorological parameters; therefore this study is aimed to measure total chlorophyll in carrots and its correlation with some metrological parameters and also their carotenoids levels. Three dominant regions of carrot cultivation which placed in Isfahan and Khuzestan provinces were selected and thirty samples were taken from each region. Chlorophyll content was measured using Arnon's method. Briefly, fresh leaves (1g) taken and homogenized with water using a blender. Then the samples were extracted by 80% acetone and centrifuged at 8000 rpm. Finally, the absorbance of supernatant was read using spectrophotometer. Correlations were then made, for each region, between total chlorophyll amount with carotenoids levels and also with meteorological parameters which were included as and temperature (T), relative humidity (RH), rain fall (RF) and Altitude (A). The highest amount of total chlorophyll was found in carrot cultivated in Andimeshk from Khuzestan province which was 1.42 ± 0.01 mg/g of fresh weight. Whilst, the minimum chlorophyll content was found to be in carrot cultivated in Dastgerd region from Isfahan province and was equaled to 0.61 ± 0.06 mg/g of fresh weight. The relationships between chlorophyll content and five meteorological parameters namely; T, RH, RF and An in two provinces were respectively as (R^2 of 0.62, 0.99, 0.85, and, 0.56, for Khuzestan and R^2 of 0.99, 0.98, 0.91 and, 0.69, for Isfahan respectively). The association between chlorophyll and carotenoids levels for Khuzestan and Isfahan were as R^2 of 0.96 and 0.99, respectively. Some meteorological indices in this study showed better linearity with chlorophyll content and are appropriate candidate for further determining chlorophyll in carrots and accordingly the medicinal and nutritional performance of carrot in similar regions can be in situ predicted by association obtained between chlorophyll and carotenoids.



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EVALUATION OF AGRONOMIC CHARACTERISTICS, SEED GERMINATION MASS OF THYME (*THYMUS VULGARIS* L.) BY GIBBERELIC ACID AND SALICYLIC ACID

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Thyme is a perennial medicinal herb belonging to the mint family (Lamiaceae) is a medicine which is used in various industries. Abiotic environmental stresses, especially drought and salinity stresses plants are a major cause of crop loss. The major effect of other stresses such as drought and salinity stresses, preventing the growth and decrease of ingredient herbal and plant response to salinity and drought understand what is most practical. In order to test the reaction of thyme seed germination in a controlled environment at the Central Agricultural Research Laboratory Ilam and Natural Resources in 2012 as a factorial experiment in a completely randomized design with three replications. Tested at two levels of gibberellic acid concentrations of 5 and 10 mg per liter, salicylic acid concentrations of 5 and 10 mg per liter of distilled water and pre-treatment control period of 2, 4 and 6 hours. The results of these tests showed that the maximum length of root and shoot, respectively, under the influence of water and Salicylic acid at a concentration of 5 mg per liter, respectively. The lowest germination percentage in control and the highest germination rate was obtained by distillation. Best time of pretreatment was achieved in 2 hours.

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COMPARISON OF TOTAL PHENOLIC CONTENTS IN THREE
INFUSIONS OF BLACK TEA

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Phenolic compounds are important secondary metabolites which present in plants and herbal infusions. *Camellia sinensis* (CS), black tea, is considered as one the most drinking in Iran and due to its well known constituent namely; Quercetin, have antioxidant properties and may have health benefit for people [1]. Among herbal infusions which traditionally used in Iran; the infusion made from *Elettaria cardamomum* Marton (EC) *Cinnamomum zeylanicum* (CZ) and *Zingiber officinale* Rosc. (ZO), have constitutently a series of phenolic active ingredients such as eugenol; gingerol which are shown to have capability for curing the inflammation diseases [2]. This study was planned in order to determine; whether the combination of black tea with each of the above mentioned infusions can result in increasing the phenol contents in black tea infusion, or not. Beside, if it is affirmative which herbal infusion can significantly increase phenolic amount compared to the other infusions. Four infusion times including time of 5, 10, 20 30 and 40 minute, which obtained from our previous studies [3], were applied for all infusions. Quantification of total phenol in each infusion of black tea (EC; CZ and ZO) was carried out by a method described by Singleton and Rossi [4]. Briefly, a 5/100 concentration (w/v) was made for each of herbals and serially diluted and total phenol (TP) was determined using Folin–Ciocalteu reagent. Finally, the absorbances of samples were read at 765nm and TP contents were expressed as gallic acid equivalents (GAE) mg /g of dry weight (DW) of plant material. The highest TP content in black tea individually was found to be within 40 min and was equaled to 23.26 ± 0.03 mg GAE/ g of DW. Among all Infusions of black tea, the highest and the lowest of TP within the time of 20 and 5 min, respectively were related to EC and ZO infusions which found to be 30.74 ± 0.24 and 4.60 ± 0.23 mg GAE/ g of DW, respectively. There was seen a significant difference in TP related to EC infusion compared to the other infusions ($P < 0.01$). The result of this study validated that the infusion of *E. cardamomum* in black tea within 20 min resulting in increase of total phenolic compounds and may have a better health benefit.

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ANTIFUNGAL ACTIVITY OF THE ESSENTIAL OIL OF
SALVIA OFFICINALIS

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The aerial parts of *Salvia* genus was widely used as medicinal and food usage. Essential oil composition of *Salvia officinalis* L. was obtained from aerial parts of this plant by hydro-distillation method by cleverger type apparatus and analyzed by gas chromatography (GC) and gas chromatography–mass spectrometry (GC-MS). Forty two components were identified in the essential oil of *S. officinalis* that represented 98.94% of the oil. The main components of essential oil of *S. officinalis* were, α -thujone (37.18%), 1, 8-cineole (12.71%), β -Thujone (9.10%), Camphene (5.54) and Virdiflorol (5.33%), The yield of essential oil of *Salvia officinalis* was calculated 2.4%. Antifungal properties of the essential oil was evaluated by disk diffusion and well diffusion methods against *Alternaria alternata* (PTCC 5224) and *Pencillium funiculosum* (PTCC 5301) and (PTCC 5169). The oil showed good antifungal activity against *Pencillium funiculosum* PTCC 5301 compared standard antibiotics. Also the results indicate that, Well diffusion method is more accurate than the disk diffusion method [1, 2].

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EFFECT OF DEFICIT IRRIGATION AND SALICYLIC ACID ON FREE PROLINE AND SOME OF PHYSIOLOGICAL CHARACTERISTICS OF BASIL (*OCIMUM BASILICA* L.)

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Basil is an important aromatic herb that cultivated throughout the world. To study the effect of deficit irrigation and foliar application of salicylic acid on physiological characteristics in various stages of basil, a test was developed and implemented as split plot in a randomized complete block design with three replications in the Agricultural Research Center of Kerman in 1391. Main factor (main plots) consisted of three levels of water stress (end of vegetative growth, reproductive growth and control) and Sub-factor (sub-plots) contains salicylic acid sprayed with 4 levels (four-leaf stage, late vegetative, early reproductive growth and controls respectively). In this study, traits such as sugar content, free proline, levels of chlorophyll a and b, and carotenoids were studied. Data analysis and comparison of data were performed with MSTAT-C software and Duncan's multiple range tests respectively. Results showed that the effect of deficit irrigation on sugar content, chlorophyll b, free proline, and carotenoids was significant. Also sprayed with salicylic acid on chlorophyll contents of a, b, & total, carotenoids and free proline content was significant, but on the sugar content was not significant. With increased water stress, increased leaf proline. Hence it can be said that one of the plant's response to drought stress, is accumulation of free proline.



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**STUDY THE EFFECT OF STRIP INTERCROPPING PATTERNS ON
MORPHOLOGICAL CHARACTERISTICS OF BEAN AND DILL IN
TABRIZ REGION, IRAN**

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In order to study the effect of intercropping on morphological characteristics of bean and dill, this experiment was set up in randomized complete block design with 8 treatments and 3 replications at Tabriz University Agricultural Research Station in 2009. Treatments consist of strip intercropping pattern includes six ratios (2: 2), (2: 4), (4: 2), (4: 6), (6: 4) and (4: 4) bean and dill respectively and two treatments of sole cultures of both species. Results showed that the effect of strip intercropping patterns was statistically significant on biological yield, leaf number of bean and dill, but they hadn't significant effect on height of dill and bean. The highest (3.51 ton/ha) and lowest (1.77 ton/ ha) biological yield of bean were obtained from sole and (2: 4) cropping patterns respectively. The highest and lowest biological yield of dill (1.347 and 0.997 ton/ha) were produced of (2: 2) and (4: 2) strip intercropping patterns respectively. Mono - culture and (2: 4) strip intercropping pattern of bean produced highest (10.67) and lowest (7.11) leaf number per plant. The highest leaf number of dill (18.42) and the lowest of dill leaf number resulted in (2: 2) and sole cropping patterns. Also (2: 2) strip intercropping of dill and sole crop of bean showed highest height of stem (47.22 and 32.28 cm) respectively. These results indicate the advantages of intercropping pattern and its positive effects on morphological characteristic of dill.

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**EFFECT OF STRIP INTERCROPPING ON LEAF AREA INDEX OF
BEAN (*PHASEOLUS VULGARIS*) AND DILL
(*ANETHUM GRAVEOLENS*)**

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In order to investigate the leaf area index and the percentage of ground cover in strip intercropping and sole cropping of bean and dill, an experiment was carried out in 2008 – 2009 farming year based on randomized complete block design with 8 treatments and 3 replications at the Tabriz University Agricultural Research Station. Treatments consist of strip intercropping pattern includes six ratios (2: 2), (2: 4), (4: 2), (4: 6), (6: 4) and (4: 4) bean and dill respectively and two treatments of sole cultures of both species. The dry matter (DM) and leaf area index (LAI) curves showed that maximum and minimum of these indices were recorded in sole culture of bean and (2: 4) strip intercropping treatments. The highest and lowest amount of LAI and DM of dill obtained in (2: 2) and (4: 2) strip intercropping treatments respectively. Also results showed that effect of different cropping patterns on the percentage of ground cover was significant statistically. Among intercropping patterns, (2: 2) strip intercropping showed the most percentage of ground cover. Also sole bean and sole dill cultures produced maximum and minimum amounts of this index. Therefore, these results indicated that interference between these two species had positive effect on dill and among intercropping patterns, (2: 2) treatment is best.

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**STUDY OF ANTINOCICEPTIVE EFFECT OF VITEX AGNUS CASTUS
ESSENTIAL OIL ON A TONIC MODEL OF FORMALIN PAIN IN
RATS: INVOLVEMENT OF OPIOIDERGIC SYSTEM**

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Chaste tree (*Vitex agnus-castus* Linn.), is an ornamental shrub or small tree widely distributed in Mediterranean coastal region and central Asia. The use of herbal treatments in the management of pain is well documented. *Vitex agnus castus* has been used in the treatment of many conditions of women's health such as menstrual disorders (amenorrhea, dysmenorrhea), premenstrual syndrome, corpus luteum insufficiency, hyperprolactinemia, menopause and disrupted lactation. *Vitex agnus-castus* is thought to be affective in the management of mastalgia because of its dopminergic effects. In this study, the effects of *Vitex agnus castus* essential oil (extracted from leaves) were investigated on a tonic model of formalin pain in 66 adult male wistar rats. Tonic pain was induced by intra plantar injection of a diluted formaldehyde solution (2.5%, 50 μ l) in the plantar surface of paw, and the time spent licking and biting was measured in five min blocks for 45 min. Formalin induced a biphasic (first phase: 0-5 min and second phase: 15-45 min) pain response.

The essential oil (25, 37.5, 50, 62.5 mg/kg) was administered intraperitoneally 30 min before formalin injection. The essential oil in doses (mg/ kg) of 50, 62.5 induced significant reduction ($p<0.05$) in pain response in the second phase of formalin induced pain when compared to sham control (Tween 80, 2.5%). The contribution of the endogenous analgesic opioid system was assessed using morphine (10mg/kg) and naloxone (1mg/kg) (an opioid receptors antagonist). Morphine significantly reduced pain response ($p<0.001$) in the both first and second phases but naloxan alone had no effect. Pretreatment with naloxan significantly reversed the essential oil-induced analgesia. These results indicate that the *Vitex* essential oil, through opioid receptors, may be involved in the modulation of the pain in rats.

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GERMINATION IMPROVEMENT IN *TANACETUM POLYCEPHALUM*

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Tanacetum polycephalum from Compositae family consist of some subspecies in Iran. The germination response of this species to various germination improvement treatments including chemical scarification (using H_2SO_4 98% for 2,5,10 min), moist chilling (in 5°C for 1, 2,3weeks), soaking seeds in GA_3 (50,100,300 ppm) for 24 h, moist chilling+ GA_3 , were studied. A completely randomized design (three replications of 50 seeds for each treatment) was used. Standard germination test showed that germination percentage of untreated seeds is 24% while after chilling treatment at 5°C for 3 weeks germination percentage reached to 62%. Soaking seeds in 300 ppm of GA_3 for 24 h resulted in 48% germination. The highest value of germination parameters detected by soaking seeds in 300 ppm of GA_3 combination moist chilling for 3 weeks at 5°C. Total germination percentage reached to 78% in this treatment. Combination of chilling and GA_3 improved seed germination significantly and was more effective than moist chilling solely. It seems that a non deep physiological dormancy mechanism restricted *Tanacetum polycephalum* seed germination.

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**EVALUATION OF MEDICINAL ORGANS OF PLANT SPECIES IN
MIANKALEH**

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Medicinal plants have value and special importance that apply to curing of diseases from centuries ago and formed the base of Iran traditional medicine. Mazandaran province because of climatic and geographical conditions, account one of the suitable areas to grow medicinal plants. In order to, present research has recognized medicinal plants of Miankaleh of Mazandaran province. First, with aerial photo and topographic maps, regions were located. Then were collected medicinal plants with field walking and by using of validities library resource factors such as part of use, remedial characteristic and chemical composition. The result showed that *Rosaceae* family have most medical species. Also, in view of chemical composition and part of use tannin and leaf had the most frequencu and the most medicinal plants have lenient remedial characteristic. In attention to styptic property of theses compositions that use to cure of domestic people diseases, using of them can be attended to multiple uses of natural ecosystem.

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ECOLOGICAL STUDIES OF *SALVIA SAHANDICA*

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Salvia species have antioxidant property. *Salvia sahandica* from Lamiaceae family is native to East Azerbaijan province and grows in alpine region of Kandovan and Shibly pass. Because of this species is extincting, for protecting this species we have studied some ecological factors .Climate information recent five years have collected , also soil samples have collected and analyzed. Ecological factors such as soil texture, PH, EC, OC, Slope direction, have studied. Species frequency is measured in the habit. Also some anatomical studies on leaves and stems have done. The results showed that this species must protect from biotic and abiotic stress.

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**EVALUATION OF MEDICINAL FLORA IN SUMMER RANGELAND
OF ARJMAND IN FIROZKOH**

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Survey of flora plant species especially medicinal plants in every area for corrected management in rangeland ecosystem that have diversity is necessary. In order to, present research has recognized flora of medicinal plants of Arjmand in Firozkoh. First, with aerial photo and topographic maps, regions were located. Then were collected medicinal plants with field walking and by using of validities library resource factors such as, flowering season, biological form, biological life and life form in each one of plants with using of Rankyh method and final analysis was performed on the data. The result showed that *labiateae* family have most medicinal species and the highest frequency percentage related to perennial species. Chamophyt with 83 percentages had the most frequency and flowering season a lot of medicinal plants is in spring.



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Survey of flora plant species especially medicinal plants in every area for corrected management in rangeland ecosystem that have diversity is necessary. In order to, present research has recognized flora of medicinal plants of Arjmand in Firozkoh. First, with aerial photo and topographic maps, regions were located. Then were collected medicinal plants with field walking and by using of validities library resource factors such as, flowering season, biological form, biological life and life form in each one of plants with using of Rankyh method and final analysis was performed on the data. The result showed that *labiateae* family have most medicinal species and the highest frequency percentage related to perennial species. Chamophyt with 83 percentages had the most frequency and flowering season a lot of medicinal plants is in spring.



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**A NEW AVENUE FOR PREDICTION OF PSEUDO CHAMOMILE
USING DECISION TREE**

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Chamomile is one of the main herbs used in all countries. In this study we used different decision tree classification algorithms to propose new tools to predict Pseudo chamomile based on protein markers. Four proteins (P45708D, P190107D, P380189D and P295120D) selected as the most important markers by differential algorithms with high accuracy. Naïve Kernel and Naïve Bayse Unsupervised Classification run were fully able to predict pseudo chamomile with over 98% accuracy. All induced trees obtained Gain Ratio, Gini Index and Information Gain Ratio algorithms generated meaningful trees which obviously predict pseudo chamomile. These trees predict pseudo chamomile with 100% accuracy. P45708D attribute clearly distinguished pseudo chamomile from others that can be a sign of pseudo chamomile. For the first time, our results showed that decision tree techniques can be effectively used to distinguish between chamomiles with the best possible accuracy.



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EFFECT OF SALINITY TREATMENT ON COLOCYNTH SEEDLING GROWTH

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Citrulluscolocynthis grows in arid regions in Iran and other countries and tend to be tolerant to drought and salinity stresses. Salinity is an important inhibitor factor for cultivation in such areas especially at germination and beginning stage of this important medicinal plant growth. This research performed to study the response of Colocynth to different levels of salinity at the stage of seedling growth. In this experiment five NaCl treatment (20, 40, 60, 80 and 100mM) and a distilled water as control were used in a completely randomized design with four replications to study the response of the plant to salinity levels. Each experiment unit consisted of a pot with 25 seeds included. The experiment stopped after emergence of the first true leaves then leaf area, fresh and dry weight of hypocotyls and epicotyls were measured. The result showed that the effect of treatments on all traits was significant (%1 level) and the treatment of 20 and 40mM NaCl had no significant different with control. Among treatments lowest level of leaf area, dry matter and fresh weight of seedling were obtained in 100 Mm of NaClconcentration. According to this study Colocynth seedling revealed tolerance to salinity up to 60mM saline condition and could be suggested for future studies and breeding program for this trait improvement.

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**ENZYMATIC TREATMENT OF *ALOE VERA* GEL TO REDUCE
VISCOSITY FOR PHARMACUTICAL APPLICATIONS**

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Aloe vera is an ancient medicinal plant containing thousands of healing substances. The *Aloe* genus belongs to the Lily family (Liliaceae). There are many species of this plant, but in most cases *Aloe Barbadosis* Miller are using. Aloe contains gelly substances between the leaves. All the healing characteristics of Aloe related to these gel materials. Aloe gel contains about 99% water, and only 1% solids materials. About 60% of solid materials are the polysaccharide. Currently there are some Aloe commercial crude materials, such as Aloe gel, Aloe gel concentrate and Aloe gel powder. All these crude materials can be used in Pharmaceutical, Cosmetic and Food industries[1]. In Aloe crude material processing, in one step Aloe gel are grinded, Aloe grinded gel is highly viscous and mucilaginous liquid that handling with them is extremely problematic. For solving this problem, some researchers propose enzymatic treatment for gel. By this treatment, gel viscosity drop and processing become easier than before[2].

The aim of this study was to enzymatic treatment of Aloe gel to produce the proper gel with optimum viscosity. For this, three parameters (Enzyme concentration, temperature and time) were chosen and experiments were design by CCD (Central Composite Design) model to get optimum treatment conditions. Gel was treated with commercial cellulase and then enzyme was deactivated thermally. Pre test results showed that, using 1% w/w enzyme to gel solid material, treatment temperature 50 C° and treatment time 20 min give the optimum viscosity of gel for processing.

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EFFECT OF POTASSIUM NITRATE PRIMING ON SEED GERMINATION OF COLOCYNTH

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The poisonous perennial *C. colocynthis*(L.) or colocynth is cultivated for medicinal purposes and rodent control. Poor germination is a common phenomenon in colocynth seeds specially in sub-optimal environmental condition. In order to improve germination process an experiment of seed priming was conducted with four treatments of KNO₃ (40, 60, 80 and 100mM) and a distilled water as control in a completely randomized design with four replications and three observations to measure total germination percentage, seedling length, mean germination time, germination index and vigor index. The seeds were primed in KNO₃ treatments for 72 hours, and dried in open air for 24 hours, then moved into perlite medium under mist system. The effect of treatments on all measured factors were significant (%1 level). As results shown, the maximum seedling length, germination percentage and vigor index was obtained in 60mM. The maximum mean germination time was in 80mM and 60mM respectively. By results of this experiment salt priming of colocynth seeds could improve germination and establishment of seedlings.

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**THE EFFECTS OF BIO-FERTILIZERS AND BIO-STIMULATORS ON
CHLOROPHYLL CONTENT AND LEAVES PROPERTIES OF *OCIMUM
BASILICUM* L.**

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Ocimum basilicum L. an herbaceous species belonging to the lamiaceae family is considered as a valuable plant for its pharmaceutical, aromatic and culinary properties. Basil has many medicinal properties including appetizer anty-parasite, diuretic, carminative stimulant and ect. This study was conducted based on factorial in completely randomized design with three replications with 16 treatments in research greenhouses of institute of medicinal plants (IMP), ACECR. The bio-stimulator spraying was done in (1.5 L/ ha⁻¹) and asfor bio-Fertilizer (500ml/5kg). The results showed that the intruction of effect of thatbio-stimulator and bio-Fertilizer had significant (P<0.01) effect on 5 parameters. in a way that the most effect on leaf fresh weight (25.47 g) and leaf dry weight (6.48g) with Fosnutren×Nitroxin, leaf number (206.33) with aminolforte×Nitroxin treatment were observed. Ofcourse it had not significant effects on theChlorophyll content and the leaf area of the plants. Generally the interaction effect of application bio-Fertilizer and bio-stimulator on the whole of parameters in the level of p<0.01 had meaning. However this study indicated that bio-stimulator and bio-fertilizer had positive effect the biomass, leaf number, leaf fresh weight, leaf dry weight, of basil as the most important photosynthetic organ. The least effect on all of parameters was obtained with control. According to these results application of bio-fertilizer and bio-stimulator are suitable recommended because of existence of these are for amino acid that are used in the structure.

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**STUDY OF OCIMUM (*OCIMUM BACILICUM* L.) GERMINATION
ATTRIBUTES AND SEED VIGOR UNDER SALINITY STRESS**

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Soil and water salinity in arid and semi-arid regions, is one of the most important stresses, can severely limit crop production. This study was conducted to evaluate the effects of saline stress on seed germination base a completely randomized design (CRD) with three replications. The salinity stress were including: (2.5, 4.7, 8.8, 13.5 and 17.79 ds.m⁻¹) and treated by applies of NaCl. The results showed that saline stress had a significant effect ($p \leq 0.01$) on quality and quantity of seedling parameters. Among pretreatment, 18.8 ds.m⁻¹ had the most positive effect on germination coefficient (GC), seed vigor and mean germination time (MGT). In order hand, these seeds at the minimum time had the most germination rate. The most and least rate of germination was obtained by control and 13.5 ds.m⁻¹ respectively. So under different level of saline stress, 8.8 ds.m⁻¹ had useful effect on radical length, more lateral roots and higher proportion of root to plumule, and the most root and plumule fresh weight was obtain by 8.8 ds.m⁻¹ treatments. Overall, application of 8.8 ds.m⁻¹ salinity on seed suggested for obtains uppermost germination characters.

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**THE EFFECTE OF DROUGHT STERSS ON GERMINATION OF
THYMUS SPECIES (*T. DAENENSIS*, *T. ERIOCALYX*, *T. VULGARIS*)**

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Due to investigating the effect of drought sterSS on *Thymus* species, a factorial disign under completely randomized design conducted with four replications. The factors of germination in vitro included *Thymus* species (*T. daenensis*, *T. ericalyx*, *T. vulgaris*) and second factor were included drought stress by PEG in 5 levels (-3, -6, -9, -12 bar and well water (control)). The percentage of germination, speed of germination, root length and shoot length were measured. The results showed that effect of species and drought stress were significant in all traits. *T. eriocalyx* had the maximum percentage of germination. Also *T. eriocalyx* produced the maximum root length and shoot length. *T. vulgaris* had the maximum speed of germination. Drought stress of -6 bar had maximum speed of germination. So, according to the results, percentage of germination, root length and shoot length. *T. eriocalyx* could be introduced as a suitable species in drought stress conditions. Finally concluded that the local species is suitable than foreign specie (*T. vulgaris*) in vitro tests.

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THE EFFECTS OF BIO-FERTILIZERS AND BIO-STIMULATORS ON
MORPHOPHYSIOLOGICAL PROPERTIES OF
OCIMUM BASILICUM L .

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Basil (*Ocimum basilicum* L) has many medicinal properties including appetizer, anti-parasitic, diuretic, and carminative. Sweet basil (*Ocimum basilicum* L.) is an annual and aromatic herb belonging to the Lamiaceae family, native to Iran, Afghanistan and India. It represents an important source of essential oil used in food, pharmaceutical, perfumery and cosmetics and etc. Bio-Fertilizers are an alternative to chemical fertilizers for increasing soil productivity and plant growth in sustainable agriculture. Therefore, it is necessary to determine the effects of Bio-Fertilizers on valuable medicinal plants such as *Ocimum basilicum* L.

This study was conducted based on factorial in completely randomized design with three replications with 16 treatments in research greenhouses of Institute of Medicinal Plants (IMP), ACECR. The bio-stimulator spraying was done in (1.5 L/ha⁻¹) and as for bio-fertilizer (500ml/5kg). The results showed that the interaction of bio-stimulator and bio-fertilizer had significant ($P < 0.01$) effect on whole of parameters in a way that the most effect on plant height (87cm) with Kadostim-Nitroxin, stem diameter (7.16cm) with Fosnutren×Nitroxin, sub shoot number (25.33) with Kadostim×Supernitroplus, leaf number (206.33) with Aminolforte×Nitroxin, leaf dry weight (6.48 g) Nitroxin, stem dry weight (17.8 g) with Kadostim×Nitroxin, root dry weight (2.41 g) with Aminolforte×Nitroxin, spike number (28.33) with Kadostim×Nitroxin, number seed per plants (1377.3) with Fosnutren×biophosphor. The interaction effect of application Bio-Fertilizers and Bio-Stimulators on the whole of parameters in the level $p < 0.01$ had meaning. The application of the Bio-Fertilizers especially Nitroxin increased quantitative biomass of Basil then the application of Bio-Fertilizers and Bio-Stimulator can be used in order to an alternative or reduction in application of chemical fertilizers in Agro-Ecosystem which is attitude toward the minimize of environmental pollution and sustainable agriculture.

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FUMIGANT TOXICITY AND MEDIAN LETHAL TIME (LT₅₀) ON THE
IMMATURE STAGES OF MEDITERRANEAN FLOUR MOTH,
EPHESTIA KUEHNIELLA ZELLER

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Many species in the plant kingdom synthesize a variety of secondary metabolites which play a role in the defense of plants against arthropods. Phytochemicals are usually less environmentally harmful than synthetic agrochemicals. Mediterranean flour moth, *Ephesiakuehniella* Zeller (Lep: Pyralidae) is a worldwide pest and its close relationship with human foods makes it prime target for control methods other than chemical pesticides. This research aim was to study the insecticidal effect of two essential oils of *Laurusnobilis* and *Myrtuscommunis* on the Mediterranean flour moth. The plant essential oils were obtained using a modified Clevenger-type apparatus through hydrodistillation [1]. Experiments were carried out at 25±2°C and 65±5%RH in scotophase period. LT₅₀ value of 3rd larvaeinstars was evaluated for essential oil of *L. nobilis* at concentrations of 18.18, 25.71 and 40 µL/L air and for essential oil of *M. communis* was evaluated at concentrations of 19.79, 28.57 and 40 µL/L air at different times. 70 ml containers were used for each concentration which contained 3rd larvaeinstar of *E. kuehniella*. The results showed that by increasing dose, mortality rate of 3rd larvaeinstars was increased and time of effect of essential oil was shorter on larvae. When concentration of essential oil of *L. nobilis* was increased from 18.18 to 40 µL/L air, mortality rate increased from 51 to 92% after 24 hours and time of effect on 50% of larvaepopulation reduced from 23 h to 13 h. By increasing dose of *M. communis* essential oil from 19.79 to 40 µL/L air, mortality rate was increased from 36 to 90% and time of effect on 50% of larvaepopulation reduced from 29 h to 16 h.

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**FUMIGANT TOXICITY AND PERSISTENCE OF TWO MEDICINAL
PLANT ESSENTIAL OILS FROM *LAURUS NOBILIS* AND *MYRTUS
COMMONIS* AGAINST ADULT STAGES OF MEDITERRANEAN
FLOUR MOTH *EPHESTIAKUEHNIELLA ZELLER***

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Mediterranean flour moth, *Ephestiakuehniella* Zeller (Lep.:Pyralidae) is a worldwide pest and its close association with human foods makes it prime target for control methods other than chemical pesticides [1]. Plant essential oils can be used as effective fumigant against different pests and not only are effective in pest control but rather are compatible with the environment and their adverse effects are less than other methods of chemical control. Fumigant toxicity of *Laurus nobilis* and *Myrtus communis* essential oils was investigated against adults (1-3 days old) of Mediterranean flour moth in 1000 ml glass vials. The plant essential oils were obtained using a modified Clevenger-type apparatus through hydrodistillation. Experiments were carried out at 25±2°C and 65±5% RH in scotophase period. Values of 1.6, 2.5, 4.4 µl/l of *Laurus nobilis* essential oil and 0.6, 2.5, 3.5 µl/l of essential oil of *Myrtus communis* were used in each glass vial and then was examined the median lethal time (LT₅₀) of essential oils. 3.5 µl/l of each essential oil was poured in each glass vial in order to determine persistence of essential oils. From beginning and every 48 hours, 10 insects were introduced each Petri dish. The mortality rate was recorded after 24 hours. LT₅₀ values for *Myrtus communis* were lower than that of the *Laurus nobilis* after 72 h of fumigation. Results showed that essential oil of *Myrtus communis* was highly toxic for Mediterranean flour moth. LT₅₀ values for persistence toxicity after fumigation were 5.02 and 10.34 days for *L. nobilis* and *M. communis*, respectively. The essential oil of *L. nobilis* had stronger activity than that of the *M. communis* on adult stage of Mediterranean flour moth. By the results obtained here it seems that using plant essential oils is effective method in pest control and can be used in IPM program.

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**THE EFFECT OF Pb ON LEAF OF *MATRICARIA CHAMOMILLA*
IN VEGETATIVE AND REPRODUCTIVE STAGES**

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Matricaria chamomilla is an important and most frequently cultivated medicinal herb that is used frequently in pharmaceutical and cosmetic industries [1]. The species has the ability to withstand some heavy metals such as cadmium and nickel [2, 3]. In the recent years, human activities such industry and agriculture promote heavy metal release into the environment [4]. Lead is the most contaminant metals in environment which adversely affects both plant and human life [5]. It is well known that plants have different resistances under heavy metals exposure [6]. In this study, effects of Pb toxicity on leaf structure of *M. chamomilla* in vegetative and reproductive stages investigated. So, plants in rosette stage were transplanted to hydroponic culture design five treatments of 0, 60, 120, 180, 240 μ M Pb. Treatments were harvested in two stages for measurement of Pb absorption and microscopic analysis. The results revealed that Pb concentration was higher in root than above ground parts in both stages. The results of study of leaf indicated changes in epicuticular waxes and size of ostiole and guard cells.

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**EFFECT OF DIFFERENT CONCENTRATIONS OF COLCHICINE ON
PLOIDY LEVELS AND MORPHOLOGY OF
DRACOCEPHALUM KOTSCHYI BOISS.**

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Dracocephalum kotschy Boiss. (Labiatae) is an endemic perennial herbaceous plant known in Iran as Zarrin-Giah. Recent pharmacological studies have confirmed some of the methoxylated flavonoids in plant's parts having anti-cancer properties [1, 2]. Excessive harvesting of wild plants, limited distribution areas are the main reasons why *D. kotschy* is now listed as an endangered plant [3]. Increasing of ploidy levels is one of methods to change of genetic status of plants which directly influence on morphological and phytochemical properties. In present study, increasing of ploidy levels was performed by different concentrations of colchicine (0.05, 0.1, 0.2, 0.5% and control) through presoaking manner at the two and four-leaf plant stage. Flow cytometry technique was used to evaluate the ploidy status in treated plants. Morphological characteristics include the length and width of stomata, plant height, number of leaf and side branches and plant survival was evaluated among treatments. Generally percentage of diploid, mixoploid and tetraploid obtained in plants by colchicines treatments were, 20, 20 and 60% respectively. Highest ploidy level and plants survival rate (76.9%) recorded in 0.05% of colchicine concentration. plants survival decreased with increasing of colchicine concentration. Maximum stomata length and width was observed in plant treated by 0.2% colchicine. Highest stomata size were recorded in treated plants which have negative correlate with plants height, number of leaves, and number of lateral branches. It seems that according to results 0.05% of colchicine can be as an effective treatment on polyploidy induction in *D. kotschy*.

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APPLICATION OF NATURAL ESSENTIAL OILS, SILVER AND
COPPER NANO-PARTICLES TO EXTEND THE VASE LIFE OF TWO
CARNATION CUT FLOWER CULTIVARS

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Essential oils (EOs), are organic natural substances that are not only safe but environmentally friendly [1]. The Eos has strong antimicrobial properties against some pathogens, because they have high levels of phenolic compounds such as carvacrol, thymol and eugenol [2]. Silver nano-particles (SNP), because of high surface area to volume ratio, provide good contact with micro-organisms and are highly effective as germicides [3]. Two concentrations (50, 100 ppm) of nano-silver (NS), nano-copper (NC), thyme essential oil (TEO), caraway essential oil (CEO), dill essential oil (DEO) and peppermint essential oil (PEO) plus 3% sucrose versus 3% sucrose solution (as control) on longevity of two cultivar carnation cut flowers “White Liberty” and “King Lion” were factorially combined in a completely randomized design with eight replications. The results showed that greatest longevity of vase life was related to NS (100 ppm) and NC (100 ppm) in two cultivars. NS (100 ppm) was prolonged vase life (6/75 days) in cv. White Liberty and (4 days) in cv. King Lion than control (11/25 days). The maximum vase life among EOs was recorded with 100 ppm TEO (2/75 days) followed by CEO (1/75 days) in cv. King Lion and 50 ppm PEO (2/25) in cv. White Liberty relative to control treatment. On the basis of these results, high concentration of nano-particles and EOs could increase vase life of carnation cut flower and act as useful preservatives in vase solution.

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EFFECT OF SOME BIO AND CHEMICAL FERTILIZERS ON SOME MORPHOLOGICAL CHARACTERISTICS AND PERCENT OF ROOT COLONIZATION OF DILL (*ANETHUM GRAVEOLENS L.*)

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Currently, medicinal plants are of considerable interest in Iran. Dill (*Anethum graveolens L.*; Fam. Umbelliferae) is one of the most important medicinal and aromatic plants due to its estrogenic activities and uses as a carminative, diuretic, anti-inflammatory, antimicrobial, and galactagogue. Also, it is given to infants in the treatment of flatulence. In addition, the volatile oils of dill are used to control flatulent dyspepsia and colic in children [1]. In order to study the effect of some bio and chemical fertilizers on some morphological characteristics and percent of root colonization of dill (*Anethum graveolens L.*) of landrace population of Hamadan two separate two-year experiment were conducted as factorial design based on completely randomized design with three replications in greenhouse conditions at the Research Station of Faculty of Agriculture, Islamic Azad University, Tabriz Branch, Iran, during 2010 and 2011. Factors in this research consisted of application mycorrhiza in three levels, including without of mycorrhiza as control, application of mycorrhiza species of *Glomus intraradices* and *G. mosseae*, nitrogen-fixing bio fertilizers in three levels including without application as control, application of *nitroxin* and *supernitroplus* and chemical fertilizers of nitrogen and phosphorus in three levels including zero, 50% and 100% of recommended dose according to soil analysis. The results showed that combined and simultaneous application of studied factors were effective on number of lateral branches and percent of root colonization with mycorrhiza. The combined application of biofertilizers under conditions of reduced nitrogen and phosphorous chemical fertilizers (zero and 50% recommended dose) associated with increasing of mean of height stem, number of lateral branches and percent of root colonization with mycorrhiza. In addition, results revealed that nitrogen-fixing biofertilizers and interaction effect of mycorrhiza and nitrogen-fixing biofertilizers had significant effect on dry weight of stem and leaf.

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**EVALUATION OF DIFFERENT SOWING DATES ON YIELD AND
YIELD COMPONENTS IN SAFFRON (*CROCUS SATIVUS* L.)**

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In order to evaluation of yield and yield components in different sowing dates of saffron (4 May, 4 June, 4 July, 4 August, 4 September and 4 October), an experiment was conducted during 2009-2010 cropping seasons in Mashhad region. The experimental design was a randomized complete block design (RCBD) with three replications. The results of variance analysis showed that there are high significant differences between different sowing dates of saffron on all traits. The results of mean comparisons showed that sowing date in 4 July had the most positive effects on saffron yield and this sowing date was in good condition in the other traits. Also the result of this test indicated delay in sowing time, especially in September and October months, will sharply reduce yield and yield components of saffron. The correlation coefficients results also showed that between saffron yield and all yield components exists positive and significant correlation. And any improvement in these components will ultimately improve saffron yield. Also the result of path analysis showed dry weight of saffron bulb had high significant positive effect on saffron yield and could justify more than 92 percent of the changes in saffron yield. The next step in path analysis indicated fresh weight of saffron bulb, leaf number, leaf length and leaf weight had the most direct and indirect effects on the improvement of dry weight of saffron bulbs. And these traits could justify more than 99 percent of the changes of dry weight of saffron bulbs. Overall, the results of this test is determined 4 July date is the best time to build a new saffron farm in the city of Mashhad. On the other hand, it was cleared that bulbs with high weight have direct and positive effect on saffron yield. Also if characteristics such as number of leaves, leaf length and leaf width are improved, these traits can directly improve dry weight of saffron bulbs and indirectly enhance saffron yield in later years.



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**THE EFFECT OF ELICITOR METHYL JASMONATE ON
SECONDARY METABOLITES OF MEDICINAL PLANT POT
MARIGOLD(CALENDULA OFFICINALIS L.)**

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Rich repository of medicinal plants secondary metabolites of many drugs are essential ingredients. Pot marigold family Composite the treatment of the skin, pain, and as a bactericide, antiseptic and anti-inflammatory used. The effect of methyl jasmonate on plant secondary metabolites Pot marigold plants for 10 days in hydroponics with Hoagland solution (1/2) were then treated with 50 and 100 micromoles per liter of methyl jasmonate. Lignin content in roots of treated plants, reduction in shoot was significantly increased compared with control plants, are shown. The total phenol content linked to the wall, the roots compared with control plants, the increase in shoot decreased. Anthocyanin content in roots of plants treated with methyl jasmonate, 50 mM decreased, but the plants treated with 100 mM methyl jasmonate, compared with control plants, no significant change. Shoot at both concentrations of methyl jasmonate, anthocyanin content compared with control plants, showed a significant decrease was observed. Flavonoid content of plant roots treated with 50 mM methyl jasmonate, compared with content a significant increase, in methyl jasmonate treated with 100 mM significantly decreased, but the total flavonoid content in treated shoot, lower than the control plants. Membrane lipid peroxide levels of both root and shoot, the treatments were not significantly changed compared to control plants. Dominant compound in the essential oil were α -Cadinol. Induction of anti-fungal sesquiterpene, α -Muureloene treatment with methyl jasmonate increased at higher concentrations, suggesting that methyl jasmonate can induce changes in the biosynthesis of Isoprenoids can be used to produce specific phytoalexins. Since methyl jasmonate as an irritating substance in plant senescence has been reported, it is likely to produce beta-carotene in the cells to be effective, because there are reports which indicate that aging leads to increased beta-carotene. This study has determined that the use of compounds that are found naturally, such as methyl jasmonate can enhance secondary metabolites to plant *Calendula officinalis* L. [1,2,3].

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**EFFECT OF CORONATINE PRETREATMENT IN BASIL
PLANT(*OCIMUM BASSILICUM*)SUBJECTED TO ARSENIC TOXICITY
ON DIFFERENCE PHENOLIC COMPOUNDS AND PAL ACTIVITY**

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Basil(*Ocimumbassilicum*)is of family Lamiaceae, a long time since traditionally as a medicinal plant in the treatment of headaches, coughs, diarrhea, constipation, kidney disease and parasites used.In order to investigate effect of coronatine pretreatment inBasil plantsubjected to arsenic toxicity on Difference phenolic compounds and PAL activity,this study was conducted in a completely randomized design. In this investigation, basil seedlings grown in a control condition were treated with coronatine (COR) at 0(Control), 50 and 100 nM and different concentration of As (V) at 0 (Control), 150 and 300 μ M. Then H₂O₂content, membranes' electrolyte leakage, phenolic compounds and anthocyanin content and PAL activity inresponse to treatments were measured. Increasing of H₂O₂ content and electrolyte leakage of basil leaves werethe symptom of arsenate toxicity that alleviate with coronatine pretreatment. The maximum amount of electrolyte leakage and H₂O₂was obtained in treatments with AS concentrations of 300 μ M without pretreatment, and the lowestwas obtained in treatments with AS concentrations of 50 μ M was to 100 nMCOR.The results of changes in ion leakage show may be coronatine by membrane integrity improved growing seedlings exposed to arsenic. The maximum amount of phenolic compound (58 mg/g FW),anthocyanin content (5.5 mg/g FW) and PAL activity (170 u/mg protein)was obtainedin treatments with AS concentrations of 150 μ Mto 100 nMCORand the lowestamount of phenolic compound (8 mg/g FW),anthocyanin content (1.2 mg/g FW) and PAL activity (23 u/mg protein)was obtained in treatments with AS concentrations of 300 μ M without pretreatment.Increasing phenolic compound andanthocyanin content and PAL activity indicate that COR as a jasmonates analogue enhanced environmentalstress tolerance in *O. basilicum*seedlings by improving antioxidative defense system seems to one of the reasons reduce the amount of H₂O₂ and ion leakage under effects coronatine pretreatment, effect coronatine on increased enzyme activity of PAL and phenolic compounds (as a component of non-enzymatic antioxidants) that can reduce the effects of stress.



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**STUDY OF YIELD AND YIELD COMPONENTS IN DIFFERENT
ECOTYPES OF SAFFRON (*CROCUS SATIVUS* L.)**

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In order to study yield and yield components in different ecotypes of saffron (Mashhad, Torbat-Jam, Gonabad and Birjand), an experiment was conducted during 2009-2010 cropping seasons in Mashhad region. The experimental design was a randomized complete block design (RCBD) with three replications. The results of variance analysis showed that there are high significant differences between different ecotypes of saffron on all traits. The results of means comparisons showed that Mashhad ecotype and Birjand ecotype in all of traits, especially in the yield of saffron, were the best and the worst ecotypes in Mashhad climatic conditions, respectively. Also, cluster analysis and comparison of different ecotypes was found for all traits are indicated ecotypes of Mashhad and Torbat-Jam were most similar and were in a class and ecotypes of Birjand and Gonabad were in another class. Finally, according to the result from this study we can express that environment and climate conditions have high effects on yield and yield components in saffron. And they can cause significant changes in saffron ecotypes. Therefore it is recommended to establish the new saffron fields, we consider to bulbs quality of saffron, saffron ecotypes and environmental conditions. And regions where saffron will be cultivated for the first time, it's very important that proper tests are done for choosing the best ecotypes.



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**EFFECT OF CORONATINE PRETREATMENT IN BASIL PLANT
(*OCIMUM BASSILICUM*)**

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Basil (*Ocimumbassilicum*) is of family Lamiaceae, a long time since traditionally as a medicinal plant in the treatment of headaches, coughs, diarrhea, constipation, kidney disease and parasites used. In order to investigate effect of coronatine pretreatment in Basil plant subjected to arsenic toxicity on Difference phenolic compounds and PAL activity, this study was conducted in a completely randomized design. In this investigation, basil seedlings grown in a control condition were treated with coronatine (COR) at 0 (Control), 50 and 100 nM and different concentration of As (V) at 0 (Control), 150 and 300 μ M. Then H₂O₂ content, membranes' electrolyte leakage, phenolic compounds and anthocyanin content and PAL activity in response to treatments were measured. Increasing of H₂O₂ content and electrolyte leakage of basil leaves were the symptom of arsenate toxicity that alleviate with coronatine pretreatment. The maximum amount of electrolyte leakage and H₂O₂ was obtained in treatments with AS concentrations of 300 μ M without pretreatment, and the lowest was obtained in treatments with AS concentrations of 50 μ M was to 100 nM COR. The results of changes in ion leakage show may be coronatine by membrane integrity improved growing seedlings exposed to arsenic. The maximum amount of phenolic compound (58 mg/g FW), anthocyanin content (5.5 mg/g FW) and PAL activity (170 u/mg protein) was obtained in treatments with AS concentrations of 150 μ M to 100 nM COR and the lowest amount of phenolic compound (8 mg/g FW), anthocyanin content (1.2 mg/g FW) and PAL activity (23 u/mg protein) was obtained in treatments with AS concentrations of 300 μ M without pretreatment. Increasing phenolic compound and anthocyanin content and PAL activity indicate that COR as a jasmonates analogue enhanced environmental stress tolerance in *O. basilicum* seedlings by improving antioxidative defense system. One of the reasons reduce the amount of H₂O₂ and ion leakage under effects coronatine pretreatment, effect coronatine on increased enzyme activity of PAL and phenolic compounds (as a component of non-enzymatic antioxidants) that can reduce the effects of stress.

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**MICRO-MORPHOLOGICAL STUDY OF MERICARP AND SEED IN
DIFFERENT ERODIUM (GERANIACEAE) SPECIES OF IRAN**

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*Erodium*L. is the third large genus of Geraniaceae family with 75 species. These are distributed in all continents except Antarctica. The main center of diversity is Mediterranean region especially western part of this region. Some *Erodium* species are medicinal plants used in Chinese traditional medicine. *Erodiumstephanianum* is used in severerheumatoid, Diarrhea, dysentery [1].*Erodiumcicutarium* has antioxidant and antivirus effects [2, 3].*Erodiumglaucophyllum* has antibacterial effect [1]. In this study seed and mericarp micro-morphology of six *Erodium* species as *E. cicutarium*, *E. ciconium*, *E. gruinum*, *E. oxyrrhynchum*,*E. malacoides*,*E. moschatum* were considered. Seed and fruit micro-morphology of these species are here studied for the first time. The length and width and surface sculpture of seed and mericarp and mericarp hair average length, hair type and frequency show differences in studied species which are of diagnostic importance.

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**THE EFFECT OF PLANT DENSITY AND DATE OF PLANTING ON
TOTAL PHENOL AND FLAVONOID OF ARTICHOKE
(*CYNARA SCOLYMUS* L.) IN GORGAN AND ILAM CONDITIONS**

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Artichoke is a perennial plant from family of Asteraceae. It is one of the most important medicinal plants in mediterranean regions. The plant is rich sources of polyphenolic compounds with high antioxidant activity. To evaluate the effect of date of planting and plant density on phenol and flavonoid contents and antioxidant activity of artichoke leaves extract, an experiment was performed in research farms of Gorgan and Ilam Universities. The experiment was based on a completely randomized block with factorial design in 3 replications. Date of planting (2 times) and plant densities (1*1m and 1*1.5m) were used as treatments. In both sowing times the plants were harvested two months after seed sowing time. In laboratory the phenol and flavonoid contents and antioxidant activity of methanolic extract were measured using standard methods. Analysis of variance of data showed that, the contents of both phenol and flavonoid as well as antioxidant activity were significantly influenced by treatments in both regions. The highest phenol content (0.139 mg/g) was observed in the samples of Ilam of first sowing time and higher plant density. Contrary to that the content of flavonoid of samples of second sowing time was in highest amount (0.381mg/g) in Ilam regions. Opposite to our exception the highest antioxidant activity (66.7%) was observed in samples of plants planted in first harvest time and high density. Based on the obtained results it can be concluded that plants grown In Ilam conditions are pharmaceutically better than gorgan. Phenols and flavonoids are not the main antioxidant agent of leaf extract.

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**SELENIUM IMPROVES GROWTH AND ANTIOXIDANT DEFENSE
SYSTEM IN *MELISSA OFFICINALIS***

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Selenium (Se) is important in antioxidation in humans and may play a role in antioxidative mechanisms in plants [1]. In this study, the influence of foliar application of Na₂SeO₃ (10 mg l⁻¹) on the some physiological characteristics of *Melissa officinalis* L. were investigated. Results indicated that an application of Se was favorable for biomass accumulation and it improved significantly shoot dry weight and relative water content in *M. officinalis* plants. Amounts of malondoialdehyde (MDA) and hydrogen peroxide (H₂O₂) reduced in se-supplemented *M. officinalis* plants obviously because of an efficient scavenging following significant enhancement of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GSH-Px) activity [2]. These results suggest that foliar applications to *M. officinalis* at 10 mg Se l⁻¹ can improve antioxidant defense system and cause a significantly higher growth rate.

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**INTERACTION OF THE AUXIN HORMONE AND ROOTING MEDIA IN
CUTTINGS OF THE MEDICINAL PLANT MYRTUS
(*MYRTUS COMMUNIS*)**

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Shrub *Myrtus* with the scientific name (*myrtus communis*) belongs to the family myrtaceae. It is a evergreen shrub and aromatic that grows in tropical areas. *Myrtus* due to essential medicines in leaf, galls on stems and fruits in traditional medicine as an anti-bacterial, antiseptic, tonic and is used in the treatment of respiratory and urinary tract disorders. This study was conducted to investigate the effect of hormones (indolebutyric acid (IBA) and Naphthalene acetic acid (NAA)) and media on rooting of hardwood cuttings of *Myrtus* and determine the best hormone treatment for rooting cuttings, in the greenhouse university of Ahvaz Ramin Agriculture and Natural Resources in 1390. A factorial experiment with different levels of the hormone auxin (0, 1000, 2000, 3000, and 4000 mg/l IBA and 1000, 2000, 3000, and 4000 mg/l NAA) and the second factor contain rooting medium (sand, perlite and sand + perlite) in completely randomized design with three replications was conducted. Traits such as rooting percentage, number of root cuttings, root length, root diameter, root fresh weight and the long roots were measured. Results showed that the hormone auxin treatment effect on all traits was significant in 1% probability level but the impact of media was significant on root length. The highest percentage of rooting cuttings and root length with treated 3000 mg/l IBA, respectively. The overall percentage of rooting treatment IBA was higher than NAA. The results hormone interacts with media showed that maximum root length of each cuttings was treatment 2000 mg/l IBA with Medium perlite. The effect of hormone and media interaction on the traits measured was not significant. The highest percentage of root number, root diameter, fresh weight and root length were obtained with 3000 mg/l of IBA. The results Hormone interacts with media showed that most of the fresh weight of roots per cutting was treatments 3000 mg/l of IBA with culture medium sand and perlite. According on the results of this study, treatment of 3000 mg/l IBA and perlite medium for rooting in *Myrtus* cuttings is recommended.

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**THE INFLUENCE OF EXOGENOUS ABA ON PHOTOSYNTHESIS AND
ANTIOXIDATIVE ENZYMES ACTIVITY IN *MELISSA OFFICINALIS***

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Different results have been reported regarding the effect of exogenous abscisic acid (ABA), an inhibitory effect of ABA on the shoot and root growth [1, 2]. In this study, the influence of foliar application of ABA (5 μ M aqueous solution [\pm]-cis, trans-isomers) on the some physiological characteristics of *Melissa officinalis* L. were investigated. Abscisic acid did not affect plants dry matter production and leaf osmotic potential. However, ABA caused a significant reduction of net assimilation rate (A) and stomatal conductance (g_s). Activity of antioxidant enzymes did not change under ABA treatment, but that of ascorbate peroxidase (APX) increased by ABA application.

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**THE EFFECT OF APPLICATION OF PHOSPHORUS FERTILIZER
AND MYCORRHIZAL FUNGUS ON YIELD, YIELD COMPONENT
AND EFFECTIVE MATERIAL OF POT MARIGOLD
(*CALENDULA OFFICINALIS*.)**

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The increasing production per unit is necessary to supply pharmaceutical industries materials that in this way the improving efficiency of inputs in cultivation of medicinal plants are the most economical and scientific method. Hence, in order to determination the best level of phosphorus fertilizer, and also explore the symbiotic fungus by two-factor factorial experimental design with few feather's *Calendula officinalis* kind and *Glomus fasciculatum* mycorrhizal fungus in University of Agriculture and Natural Resources Khuzestan Ramin was carried out in four replications in a greenhouse. The first factor, P fertilizer (super triple phosphate) equal to zero, 40, 80, 120 and 160 kg per hectare and the second factor, consisting of two levels of mycorrhizal fungus taking respectively. General characteristics as plant height, number of flowers, fresh and dry root yield, seed yield and extract yield of dried shoots. Analysis of variance showed that the effect Phosphorus fertilizer was significant on all traits tested at 1%. Application of mycorrhizal on the characteristics case except that the extracts dried shoots at 5% level was significant at 1% of significantly. Interactions between these factor of the performance in fresh and dry root at 1%, plant height and flower number was significant at the 5% level, but on seed yield and shoot dry extract yield was not significant. Application of arbuscular mycorrhizal fungi and phosphorus alone and combined, increased nutrient concentration and total flavonoids of Pot marigold. Comparison showed that the treatments Phosphorus and mycorrhizal fungus were obtained with the 160 kg/ha yield the highest intake of treatment few feather's *Calendula officinalis* with mycorrhizal symbiosis suggests the climate in Ramin-Ahvaz. Phosphorus as one of the three elements required for increased plant height, number of flowers and plant extracts were dried, Also application of mycorrhizal fungi *G. fasciculatum* increased the traits, of reason is the mechanism of action of mycorrhizal fungi in uptake of phosphorus [1-4].

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**THE EFFECT OF DIFFERENT SUGAR ON ROSMARINIC ACID
PRODUCTION IN *SALVIA REUTERANA* HAIRY ROOT CULTURE**

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Rosmarinic acid is an important phenolic active compound and has astringent properties, antioxidant capacity, anti-inflammatory activity, antimutagenic ability, antimicrobial capacity, and antiviral properties. Rosmarinic acid is an ester of caffeic acid and 3, 4-dihydroxyphenyllactic acid, which is mainly found in the plant species of Lamiaceae [1,2]. To investigate the effect of different sugar source on rosmarinic acid production in hairy root cultures, we established a hairy root culture of *Salvia reuterana* by infecting leaf explants with *Agrobacterium rhizogenes* strain ATTC15834.

We found the leaves of this species to be the best target-sites for transformed root induction. Also we observed that hairy root induction in *S. reuterana* cannot be made by inoculation of petiole. Within 11 days, hairy roots appeared from wounded sites and were cut from the explants tissue and sub-cultured in the dark at 25°C on 75cc of MS liquid medium in 250 ml flasks on a rotary shaker. After repeated sub-culturing a high growth clone was selected and established for experiments in MS medium containing different sugars including fructose, glucose and sucrose. Then cultures were harvested after 28 days and quantitative analyses of rosmarinic acid were carried out using HPTLC. Comparison of treatment means showed that there were no static differences between three carbon sources in terms of rosmarinic acid accumulation in *S. reuterana* hairy roots. Besides, product yield (g rosmarinic acid/g sugar) was calculated by dividing rosmarinic acid production in each flask by the initial carbon source concentration in the medium. The result showed that sucrose as carbon source was more effective compared with the other carbon source (glucose and fructose) under study. In this case the rosmarinic acid achieved a 1.6 and two-fold higher yield (5.01 mg RA/ g sucrose compared to 3.03 mg/g glucose and 2.47 mg/g fructose).

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CYTOTOXICITY EFFECTS OF SCORZONERA GROSSHEIMII LIPSCH. & VASSILCZ EXTRACT ON HELA CELL LINE AND MCF-7 CELL LINE.

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The study was aimed to evaluation of the anticancer activity of ethanolic extract of *Scorzonera grossheimii Lipsch. & Vassilcz*. The cytotoxicity of *Scorzonera grossheimii Lipsch. & Vassilcz* on HeLa cell and MCF-7 Cell was evaluated by MTT assay after 72 hours. The extract of *Scorzonera grossheimii Lipsch. & Vassilcz* include cytotoxicity effected in concentration such as 10 , 7.5 , 5 , 2.5 , 1.25 , 0.625 , 0.312 and 0.156 mg/ml and the rate of percentage's inhibitory on HeLa cell line followed 78.1, 88.033 , 79.366 , 86.533 , 85.3 , 71.6 , 58.466 and 63.733. Ethanolic extract of *Scorzonera grossheimii Lipsch. & Vassilcz* has significant cytotoxicity effect on HeLa Cell Line in 1,25 mg/ml concentrations after 72 hours treatment (*P<0.05). IC₅₀ for ethanolic extract of *Scorzonera grossheimii Lipsch. & Vassilcz* on HeLa Cell Line is measured 0.296 mg/ml.

In conclusion ethanolic extract of *Scorzonera grossheimii Lipsch. & Vassilcz* has inhibitory effect on HeLa Cell Line growth. The extract of *Scorzonera grossheimii Lipsch. & Vassilcz* include cytotoxicity effected in concentration such as 10, 7.5, 5, 2.5, 1.25, 0.625, 0.312 and 0.156 mg/ml and the rate of percentage's inhibitory on MCF-7 cell line followed 14.366,42.633, 57.533, 64.166, 76.033, 60.066, 45.2 and 35.2 Also theas results illustrate that Ethanolic extract of *Scorzonera grossheimii Lipsch. & Vassilcz* has significant cytotoxicity effect on HeLa Cell Line in 2.5 and 7.5 mg/ml concentrations after 72 hours treatment. (*P<0.05). IC₅₀ for ethanolic extract of *Scorzonera grossheimii Lipsch. & Vassilcz* on MCF-7 Cell Line is measured 0.436 mg/ml.



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**EVALUATION OF IN VITRO CULTURE OF MOHR-E KHOSH
MEDICINAL PLANT SPECIES**

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Zhumeriamajdae from Lamiaceae family is a native species of Iran and is considered as an endangered medicinal plant which is used for the treatment of digestive diseases and painful menstrual periods. Because of small habitats, restricted distribution, low density and medicinal use of this plant, tissue culture can be a good method for its rapid proliferation. To evaluate the effect of plant hormone treatments on callus induction of Mohr-e Khosh, three explants (meristem, leave and stem) were selected. For sterilization of explants, Clorox 20 % was applied for about 20 minutes. Callus induction was investigated by culturing explants on M.s. medium with hormone treatments including 1 mg/l NAA (Naftalic Acetic Acide), 1 mg/l BAP (6-BenzylAminoPurine), 0.5 mg/l Kin (Kinetin) and 0.5 mg/l TDZ (Thidiazuron). Fresh weight and transparency of each callus was measured for each treatment. The experiments were carried out in completely randomized design with four replications. The best medium for callus induction with high fresh weight was hormonal treatment of NAA 1mg/L+ Kin 0.5mg/L detected from leaf explants. The hormone synthesis of NAA 1mg/L+ BAP 1mg/L produced high transparency green callus.



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**THE EFFECT OF ANTIOXIDANT ATTRIBUTES OF AQUEOUS
GARLIC EXTRACT IN MICE**

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Parasitic helminths of genus *Schistosoma* are the causative agents of schistosomiasis, an infectious illness affecting both humans and animals. Schistosomiasis is a parasitic disease that has attracted increased focus and funding for control [1]. Garlic has been utilized as a folk remedy for a variety of ailments since ancient times. The goal of this study was the investigation of the antioxidant activities of the garlic extract on both normal and *Schistosoma mansoni*-infected mice. A volume of 125 mg/kg bw. was administered in combination for 28 days. Additionally, all mice were sacrificed the post infection each day. They had 7 post infections in a week. Hematological and biochemical parameters including liver and kidney functions were measured to assess the progress of anemia, and the possibility of the tissue damage. Serum total protein level, albumin and cholesterol were also determined. The level of malondialdehyde (MDA) was determined as biomarkers for the recording of percentage of the recovered worms and tissue eggs. There were two types of infected mice for our study. The first group was infected-untreated mice and the second one was infected-treated group by garlic extract. Results showed that, protection with aqueous garlic extract in the second group prevented most of the hematological and biochemical changes and noticeably improved the antioxidant capacity of schistosomiasis mice. In addition, significant reduction in worms, tissue eggs were recorded in all treated groups. The antioxidant and antischistosomal action of aqueous garlic extract was a useful compound to complement for the treatment of schistosomiasis disease.

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**EVALUATION OF MOHR-E KHOSH
(*ZHMERIAMAJDAERECH. F. & WENDELBO*) TISSUE CULTURE**

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Mohr-e- Khosh species from Lamiaceae family one of the endemic species of Iran which is used in curing gastrointestinal diseases such as diarrhea, flatulence, abdominal pain, sour stomach and heartburn. It is also used for its cold effects. Its few habitats and excessive use has endangered it and tissue culture can be used as a new approach to proliferate it in a relatively short time. To evaluate the effect of plant hormone treatments on callus induction of Mohr-e-Khosh, three explants (meristem, leave and stem) were selected. For sterilization of explants, Sodium hypochlorite 20% was applied for about 20 minutes. Callus induction was investigated by culturing explants on MS medium with hormone treatments including Auxin: IBA (indole - butyric acid) 1 mg/l, Cytokinin: 0.5 mg/l Kin (Kinetin), 1 mg/l BAP (6 - Benzyl amino purine) and 0.5 mg/l TDZ (Thidiazuron). Fresh weight and transparency of each callus was measured for each treatment. The experiments were carried out in completely randomized design with four replications. The best medium for callus induction with high fresh weight and production of high transparency green callus was hormonal treatment of IBA 1mg/L + TDZ 0.5mg/L detected from meristem explants.



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**EFFECT OF BAP HORMONE TREATMENT ON *IN VITRO* SHOOT
REGENERATION AND PROLIFERATION OF MEDICINE
HERBHENBANE LATTICE (*HYOSCYAMUS RETICULATUS* L.)**

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Henbane lattice (*Hyoscyamusreticulatus*L.), as important medicinal herb, belongs to solanaceae family is native of Europe. *Hyoscyamus* species are rich sources of tropane alkaloids, mainly hyoscyamine and scopolamine, which are widely used for their mydriatic, antispasmodic, anticholinergic, analgesic and sedative properties [1, 2]. Proliferation and exploitation of medicinal plants is main object of modern technologies such as biotechnology and plant tissue culture. The effects of different concentrations of BAP and IAA on *In vitro* culture regeneration of henbane lattice were studied. This experiment were performed in factorial completely randomized design with BAP in three levels (0, 4.4, 8.8 μ M) and IAA in three levels (0, 1.1, 2.2 μ M) and in three replications. Results of ANOVA showed that there is significant difference between treatments ($P < 0.01$). The highest average of regenerated shoots (5.8) and percentage of regeneration (100%) was obtained in 8.8 μ M BAP without IAA and the lowest average shoot Regeneration (0) and percentage of regeneration (0%) was observed on MS medium without hormone. The maximum number of regenerated shoots (10) and 100% regeneration was observed on 8.8 μ M BAP. The minimum regeneration percentage (0%) was obtained in MS medium without hormones. Rooting experiments were performed in factorial completely randomized design with IBA in two levels (1.1, 2.2 μ M), and IAA in two levels (1.1, 2.2 μ M), on basal MS media. The results showed that the highest percentage of rooting (86.67%) was observed on MS medium without hormone and MS + IAA (1/1 μ M), with average 4.3 and 3.33 respectively. *In vitro* regenerated shoots were acclimatized in sterile perlite media with 100% survivals.

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**ANTIOXIDANT ACTIVITY OF TWO SEA CUCUMBER SPECIES AND
BROWN ALGAE FROM PERSIAN GULF**

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Among marine organisms sea cucumbers and Brown algae are potentially presented as the marine sources of antioxidant compounds. Natural antioxidants, found in many algae and sea cucumbers, are important bioactive compounds that play an important role against various diseases and ageing processes through protection of cells from oxidative damage. In this study the Ferric Reducing Ability of Plasma (FRAP) activity of two Sea Cucumber Species, *Holothuria leucospilota*, *Bohadschia Marmorata* and a brown algae *Padina boergesenii* has been evaluated.

Methanol and water methanol extracts were prepared from body wall and coelomic fluid of *H. leucospilota* and *B. Marmorata* and methanol extract from *P. boergesenii* collected from Persian Gulf. The extracts showed a antioxidant effect from 36.75 μ mol / lit of FeSO₄ in methanolic extract of *B. Marmorata* to 153 μ mol/ lit of methanolic extract of coelomic fluid of *H. leucospilota*. All the plant samples possessed antioxidant activity, while *H. leucospilota* (MeOH extract of coelomic fluid), *P. boergesenii* (MeOH extract) showed significantly the highest results methanol and water-methanol extract of *B. Marmorata* showed the lowest power. Antioxidant activity of these species might be due to the presence of carotenoid fucoxanthin, active phenolic compounds, and monoterpenes in the extracts.

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COMPARISON OF 1,8-CINEOLE IN THE ESSENCE OF FOUR WILD
POPULATIONS OF YELLOW YARROW
(*ACHILLEA WILHELMSIIC.KOCH*) IN FARS PROVINCE

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Yellow yarrow is one of valuable medicinal and industrial species in Iran's ranges and belongs to the Asteraceae family. In traditional medicine, the plant has been used for alleviating chest discomfort, and as a tonic and carminative substance. 1,8cineole is the only combination that has been reported as a major component in all yellow yarrow studies. It has the anesthetic, anti-allergic, antiseptic, bactericidal and nonproductive properties and is used for lowering blood pressure, treating inflammation of the larynx, and healing cough and bronchitis. Therefore it is very important in medicine. This study was designed to compare the active ingredient 1,8cineole of four wild populations of yellow yarrow (*A.wilhelmsii*C.Koch) in Fars province. The flowering plants of this species were collected in late May, 2011 from two regions of Fars province. From each species dried in the open air, 50 grams essence was extracted using water distillation for 3 hours. To measure and identify combinations of essence, GC and GC / MS machines were used. The results revealed differences between the four wild populations in terms of active ingredients. The percentage of essences was 0.63% for wild population of DashteArzhan, 0.22% for IzadKhast population, 0.20% for Jahrom population and 0.15% for Kazeroun population. The amounts of 1,8cineole active ingredient for the above wild populations of yellow yarrow are: 17.93% for DashteArzhan population, 8.23% for IzadKhast population, 10.3% for Kazeroun population and 8.77% for Jahrom population. The results show that the climatic condition affects the percentage and components of essence in a given species.



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THE EFFECT OF PLANTING DATE AND HARVEST STAGE ON
GROWING INDEXES AND PERCENTAGE THYMOLIN
SATUREJAHORTENSIS L

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Satureja which is called Marzeh in Persian has 15 different species of annuals and perennials 9 of which are exclusively grown in Iran. To evaluate the effect of harvest and plantation date on, quantity and quality of summer savory herb (*Saturejahortensis L*), in crops year 1390-1391 a farming pilot in the form of random complete block design with three replications was carried out in town at the Saveh Islamic Azad University research farm. The first treatment was carried out by planting in 3 different dates which are on Ordibehesht 15, Ordibehesh 25 and Khordad 5 respectively and the second treatment was by harvesting before flowering, in full blooming stage and at the beginning of fruit set. Different parts of *Saturejahortensis* were harvested and immediately were weighed with a scale of 0/01 accuracy and recorded. And then the parts were dried in shade. Then the essential oil of dried samples was distilled through Clevenger method and then their chemical compounds were identified by gas chromatography (GC). Findings have shown that planting date and harvest stage have significantly influenced the weight of dried leaves, dried flowers, dried stem and also the percentage of Thymol up to 1%. The highest weight of dried flowers, dried stems and percentage of Thymol were obtained during plantation dated Ordibehesht 15, however, the highest of dried leaves were obtained during plantation dated Khordad 5. Moreover the highest weight of dried leaves, dried flowers and dried stems were obtained at the beginning of fruit set and highest percentage of Thymol was gotten before flowering. Therefore it is concluded that plantation dated Ordibehesht 15 and the harvest at the beginning of fruit set have made the highest weight of dried stems be obtained and plantation dated Khordad 5 and harvest at the beginning of fruit set have made the highest weight of dried leaves and dried stem be obtained where as the highest percentage of Thymol was obtained in plantation dated Ordibehesht 15 and harvest before flowering.

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**CHEMICAL ANALYSIS OF HOPS (*HUMULUS LUPULUS* L.) EXTRACT
COLLECTED FROM ZARRIN GOL ZONE, GOLESTAN
PROVINCE, IRAN**

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Hops (*Humulus lupulus*) is a Perennial herb, dioecious plant, climbing and native northern Iran such as Arasbaran, Astara, Talish, Rasht, Lahijan, Bandar-i Gaz and Zarrin Gol zone. In most countries was cultured for Pharmaceutical and industrial purposes. This herb has many Pharmaceutical effects such as sedative, appetite stimulants, anti-anxiety and anti-microbial. Also the hops extract as a preservative and antimicrobial use in food industrial such as none alcohol beer production. In This research golden flower of hops were collected in Golestan Province in Zarrin Gol village. Female cones were dried at laboratory temperate and shadow. Then the extract was prepared by water and methanol in Equal proportions. By using Rotary device plant extraction was concentrated and analyzed by HPLC. The major components was detected are alpha acids such as humulone, cohumulone, adhumulone and beta acids such as lupulone, colupulone, adlupulone. Also xanthohumol compound that anti-cancer affects is known. Alpha acids and beta acids are compounds with high economic importance, and this is due to the presence of these compounds that in developed countries, herbal hops cultivation is very wide. According to role of hops in the pharmaceutical, food and cosmetics industries the domestic production and wide cultivation in Iran is very important.



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**LOCAL EFFECT OF EUGENOL OIL ON THE SKIN
WOUND HEALING IN RAT**

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One of the most important issues that science and veterinary medicine has been faced with the issue is the treatment of wounds. Variety of synthetic drugs has long been the more chemicals are introduced to accelerate the healing process and have been used, which unfortunately most of them have side effects are numerous. To determine the effect of clove extract on topical skin wound healing in rat was conducted.

In this experimental were study 60 male rats. The mice were randomly divided into control and treatment groups were divided. Shear length and 2 cm thick dermis on the back of the animals under topical anesthesia was induced with Lidocaine. For the control group received no treatment, treatment groups, received Eugenol oil twice daily until the start of the experiment. Calculate the percentage of wound healing, wound length measured on days 2, 6, 10, 14, 18, 22 after cut wound and pathological study of wound healing complete. Result: Eugenol on the process and reduce shrinkage during wound healing and it has no positive effect and while this material could reduce the number of Neutrophils ($p < 0 / 05$) and Increase the number of Eosinophils ($P < 0 / 05$). Effect of Eugenol oil on the reduction inflammation and tissue repair time reduction compared to control was significant. This combination due to phenolic substances in their antibacterial properties and also the regulatory process is inflammation. Also reduced Neutrophils by reducing the severity of inflammation in the inflammatory phase are restored. Reduces the inflammatory phase is caused reduces wound healing time. Eugenol an effective role on quality alone is healing process. But reduce the length of the wound, the expected effect does not show us.

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INFLUENCE OF MANURE, COMPOST AND BIOFERTILIZER ON
GROWTH AND YIELD OF AJOWAN
(*TRACHYSPERMUM AMMI* SPRAGUE)

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Ajowan is plant from Apiaceae family with a wide range of usage in traditional medicine. The nutrient requirement of ajowan (*Trachyspermum ammi* Sprague) is generally met by the application of chemical fertilizers. Information on use of organic sources of nutrition are lacking in ajowan. The production of ajowan can be increased considerably through integrated nutrient management. A field experiment was conducted at research field of agricultural faculty of Ramin University of Ahvaz to study the influence of manure, compost and bio-fertilizers on growth and yield of ajowan (*Trachyspermum ammi*). The factors were manure (0, 1.5 and 3 t ha⁻¹), compost (0, 2 and 4 t ha⁻¹) and azotobacter inoculation (inoculated and non-inoculated). The experiment design was factorial experiment in the base of randomized complete blocks design (RCBD) with eighteen treatments and three replications. Mean comparison was carried out using LSD range test (at 5% level). The results showed that application of manure and compost at all levels with and without bio-fertilizer had significant effect on plant height, yield, umbels plant⁻¹, umbellets umbel⁻¹, seeds umbellet⁻¹ and 1000-seed weight. With increasing manure with biofertilizer, umbels per plant⁻¹, umbels per plant, seeds umbellet⁻¹, 1000-seed weight and seed yield per ha were increased. The highest seed yield (1123 kg ha⁻¹) of ajowan was obtained with application of manure 3 t ha⁻¹ + compost 2 t ha⁻¹ with azotobacter. Prabhu et al reported significantly higher yield of coriander with 25% recommended dose of fertilizer + FYM 10 t ha⁻¹ + Azospirillum sp. with VAM over other combination of nutrient sources [1]. Similar results were obtained by Mehta et al in case of fennel and dill [2]. Application of manure, compost and biofertilizer is responsible for the improvement of physical, chemical and biological properties of the soil which in turn enhance availability and uptake of macro and micronutrients which affect various physical and biochemical processes in plants resulting better yield attributing characters and yield of the crop.

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VARIATION OF RUTIN CONTENT IN CAPER LEAVES DURING THEIR
PHENOLOGICAL CYCLES

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Capparis spinosa has attracted scientific interest worldwide in recent years, since it is a source of variety of biological active compounds including flavonoids. The most abundant flavonoid in *C. spinosa* is rutin and the presence of flavonoid rutin makes caper a valuable medicine herb. Rutin is found in many plants; especially the buckwheat plant *Fagopyrum esculentum* Moench [1] *Sophora japonica*, *Eucalyptus macrorrhynca* and *capparis spinosa*, but only a small number of medical plants contain quantities sufficient for industrial extraction. Rutin is an important therapeutic substance that influences the increase of blood vessel elasticity and the treatment of circulatory disorders. It reduces blood pressure, stimulates vitamin C utilization and has high antioxidant activity. Among different caper tissues, leaves contain highest amount of rutin [2]. Hence, focusing our attention on natural sources of rutin, this study was carried out to evaluation of rutin content during leaves phenological stages. Caper leaves were collected from Tafresh/Iran at different stages of plant phenology: Vegetative stage, floral budding stage, full flowering stage, fresh fruiting stage and mature fruiting stage. After drying in an ambient room samples were extracted with methanol, acetic acid and water (100, 2, and 100) for one hour and subsequently were assayed for rutin content by HPLC. Highest amount of rutin was measured at floral budding stage (25.82 mg/g), followed by vegetative stage (24.72 mg/g). Leaves at fresh fruiting stage and full flowering stage contain (18.12 mg/g) and (14.80 mg/g) rutin respectively. It reaches the lowest level (6.72 mg/g) at mature fruiting stage. It can be concluded that there is a close relationship between rutin content of leaves and growth stages during phenological cycles in *C. spinosa* and caper plant at floral budding and vegetative stage contains highest amount of rutin content.

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**THE CHANGES OF HYPOPHYSYS HORMONES IN PCOS RATS THAT
TREATED WITH AQUEOUS FENNEL EXTRACT**

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PCO affects approximately 5-10% of women in the reproductive age. LH and FSH are the pituitary hormone that control ovarian function [1, 2]. The aim of this study was to determine the incidence of abnormal LH/FSH ratio in female rats that induced PCO with Estradiol-Valerate and the fennel affection of equilibrium of abnormal hormones in PCO rats. In this research, after preparing the aqueous fennel extract, forty female rats divided into five equal groups were categorized in: 1) Control group: rats received just food and water, 2) Rats were gavaged by high dose fennel extract. 3) Rats were injected by Estradiol-Valerate for induction of PCOS, 4) Rats were injected by Estradiol-Valerate and treated with high dose fennel extract, 5) Rats were injected by Estradiol-Valerate and treated by low dose fennel extract. After one month, serum level of LH and FSH were determined by analyzer system and then assayed by SPSS. Normally FSH is higher than LH but in PCO group this ratio was reserved, with LH being higher than FSH. In PCO group that treated with fennel LH and FSH rate became almost normally. PCOS is a metabolic disease that disturbs LH and FSH rates but fennel returns the hormones to normal conditions. We can suggest that fennel can treat the PCO and the high doses are more effective.

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**THE EFFECT OF AQUEOUS AND METHANOLIC EXTRACT OF
CAPER LEAF AND GA₃ ON GERMINATION OF *CAPPARIS SPINOSA*.**

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Capparis spinosa is a multipurpose plant established to have highly diverse economic and medicinal value in different system of medicines like in Iranian, Unani, Chinese, Ayurvedic and Greco-Arabi System of medicines. *C. spinosa* is well known with its common name 'Caper' in different countries [1]. Its extract can be used as anti-oxidative antihepatotoxic antifungal, anti-diabetic antileishmania, anti-inflammatory, antiallergic and anticancer. It is also used for the treatments of cardiovascular diseases and diabetes mellitus [2]. Also is a suitable plant for combating desertification. Caper seed has poor germination because of the seed coat dormancy. Germination of caper seed is complex traits and affected by a wide range of internal and external influences. In this study several treatment were evaluated to determine the ability of several factors to increase the percentage of germination. Seeds were subjected to different treatment: 1- soaking in methanolic and aqueous extraction from caper leaf (1, 2, 3 days) after soaking in H₂SO₄ for (1.5 and 2.5 h), 2- H₂SO₄ (1.5 and 2.5 h) followed by GA₃ (1,2,3,4 days and 150, 200, 250, 300 ppm), and untreated seeds(control). High germination were obtained under sulfuric acid application for 2.5 h followed by GA₃ (200 ppm, 4 days) and sulfuric acid for (1.5h) followed by GA₃ (300 ppm, 4days). Germination started and stopped 14 and 38 days after treatment. The result of this study showed that the leaf extract of *C. spinosa* (aqueous and methanolic) had an inhibitory effect on seed germination.

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**EFFECT OF DENSITY ON QUANTITY CHARACTERISTICS OF
THYMUS SPECIES (*T. DAENENSIS*, *T. ERIOCALYX*, *T. VULGARIS*)
IN DRY LAND CONDITION OF KERMANSHAH**

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Due to investigating the effect of density on quality and quantity characteristics of *Thymus* species in dry land condition of kermanshah, a split plot design under complete randomized block design with three replications. main plots included thyme species in 3 levels (*T. daenensis*, *T. eriocalyx*, *T. vulgaris*) sub plots were included plant density in 3 levels (4,6,8 plants /m²). Characteristics which measured were Plant height, canopy diameter, number of flowering shoots, fresh weight per plant, dry weight per plant and yield. The results showed that effect of species and density were significant. but the interaction was not significant. High density (8 plants /m²) produced the most yield. Result of comparison the species mean showed that *T. daenensis* had the maximum height, canopy diameter, fresh weight and yield in the dry conditions. Species, *T. vulgaris* had the maximum number of flowering shoots. So, according to the results, yield, *T. daenensis* could be introduced as a suitable species in dry conditions.

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AUTECOLOGY AND PHENOLOGY STUDY OF *SALVIA LERIIFOLIA*

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Salvia leriifolia is a member of Lamiaceae family that is the native of Khorasan and Semnan province which have medical properties such as: antioxidant, anti bacterial, anti fungal, anti diabetes and sedative [1]. In order to study the ecological and phenological characteristics of this plant species in arid areas this research was done by using GPS, geographical coordinates and altitude of site with three repetitions. The initial study showed that this plant can grow in the high altitude (between 900 to 1650 meters), south slope, 80mm average annual precipitation and 2.14 annual temperatures. Botanical characteristics, plant density and different phenological stages of the plant were evaluated using by visits during 2 years. The results showed that this plant can grow in rocky Sandy loam with 64% same soil texture. Also germination and plant growth begins in the second half of March month and lasts until mid April. Generally, the study showed that salvia seeds emergence beginning from the end of April to early May and in mid May the seeds start to ripe and end of the growth cycle will be from July to early November, depending on weather conditions.



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**HAIRY ROOT CULTURES OF *SALVIA REUTERANA* TRANSFORMED
WITH *AGROBACTERIUM RHIZOGENES***

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Hairy root induction is the result of the infection of plant tissues with *Agrobacterium rhizogenes* and subsequently integration of root induction plasmid (PRi) T-DNA into the plant genome and its subsequent expression [1]. Hairy root characterized by sustainable and high production of secondary metabolism which can significantly affect by nutritional and environmental factors such as type of culture medium [2,3]. In the present study for the first time *Salvia reuterana* hairy roots induced by infecting leaf explants with *Agrobacterium rhizogenes* strain ATTC15834. Transgenic hairy roots were confirmed by PCR using *rolC* and *VirD* specific primers. As determined by HPTLC, these hairy root cultures had the ability to produce rosmarinic acid (RA).

The effect of five different liquid medium, B5, ½ B5, MS, White's, WPM on the rosmarinic acid production in *Salvia reuterana* hairy root was studied. The results of statistical analysis indicated that effect of culture medium type on RA production was significant at 1% level. Hairy roots were grown in B5 medium produced the highest amount of RA (52.26 mg/g DW), which was 1.5-fold compared to hairy roots were grown in MS medium. Also it was found that the lowest production of RA (13.53 mg/g DW) was observed in hairy roots which were grown in ½ B5 medium (13.5 mg/g DW). The different effects of these various culture mediums on RA production may be related to their different nutritional values or physical roles as a somatically active solute [4]. Our results suggest that hairy root culture of *Salvia reuterana* might be a good source for RA production. Also these findings are in alliance with the previous study which indicated the importance of the selection of the best culture medium for achieved to maximum secondary metabolism production [2, 4], therefore B5 liquid medium is useful for RA production in hairy root culture of *Salvia reuterana*.

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**COMPARISON OF SALVIA (*SALVIA SCLAREA* L.) ACCESSIONS
ACCORDING TO MORPHOLOGICAL TRAITS, ESSENCE YIELD AND
CHEMICAL COMPOUNDS**

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Salvia is the biggest genus of Lamiaceae family. 58 annual or perennial grass species of this genus are growing naturally in Iran. 17 species of them are endemic to Iran. *Salvia* species around the world are grown and consumed for their medicinal benefits as antibacterial, antioxidant, anti diabetes and anti cancer. Morphological traits, essence content and chemical compounds in four accessions of *salvia* (*Salvia sclarea* L.) were investigated. Chemical compounds of essence were analyzed by gas chromatography (GC) and GC/MS. Essence content varied from 0.31% (Semnan accession) to 0.66% (Yazd accession). Altogether 33 compounds were detected in which linalool (12-21%), linalool acetate (13-53 %) and karufilin (3-21%) were the highest amounts. Shiraz accession was recognized as the best because of high essence yield, petal and sepal length as well as its high amount of medicinal compounds.



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THE EVALUATION EFFECTS OF PLANT DENSITY AND SOWING DATES ON YIELD AND YIELD COMPONENTS OF BLACK CUMIN (*NIGELLA SATIVA*) UNDER ILAM CLIMATE CONDITION

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In order to study of plant density and sowing dates on yield, yield components of black cumin (*Nigella sativa*) under Ilam climate condition, an experiment in a factorial experiment based on randomized complete block design with four replications, an experiment of village banghlan of Ilam in Iran in 2011. In this experiment, the plant densities factor with four space (50, 100, 200 and 300 plant/ m²) and sowing dates factor with four space (9, 10, 30 Apr and 10 May) were evaluated using. Results obtained from data variance analysis showed that the effect plant densities on seed yield with in probability level 1% are significant. The result showed that highest yield of grain in 300 plant/m² and lowest grain yield in 50 plant/m². Plant density did not have significant effects on other characteristics. Also result showed that sowing date had level 1% is significant effects on grain yield, biological yield, 1000 seed weight, plant height, number of capsules per plant, number of seed per capsule and number of branches per plant. First and fourth sowing dates produced the highest and the lowest grain yield on four sowing dates. Interaction plant density / sowing date did not have significant effects on plant height, biological yield, 1000 seed weight, number of seed per capsule and number of branches per plant. The results of this experiment indicated that, first sowing date (9 Apr) and plant density 300 plant/m² have produced the highest grain yield under Ilam climate condition

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INVESTIGATION ON MORPHOLOGY AND ROOT YIELD OF
CHICORY (*C. INTYBUS*) LANDRACES FOR INULIN PRODUCTION

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Chicory (*Cichorium intybus*) as an old volunteer pharmaceutical plant had many uses at the world. All parts of it used as a biliary, appetizer, cure of liver abnormalities, and rejection of urinary sediments, but its famous is for liver development. New studies recommended this plant as anti-diabetic and anti cancer. Root, leaf and seed of this plant contain *inulin*, *sesquiterpenoid lactones*, *Coumarin* and *flavonoids*. Chicory cultivation is developing as the main source of inulin at Europe countries, Japan, China and other countries. This investigation was done at science and food technology institute to evaluate 11 Iranian genotypes of chicory for inulin production along with an old cultivar of Europe for inulin production as control in 2012. Genotypes were planted on mid March. Traits under study were width and length of leaf, dry weight of root and shoot and their ratio at two stages (beginning of rosette and one month before harvesting date), formation of flowering stem, bud number in crown, hair of leaf, and final plant height. According to the no correlation between inulin percent and root yield of chicory as yield components of inulin yield, then yield of root can be the major cause of increase of inulin yield. Dry weight of root (DWR) per plant was favorable at first sampling at rosette stage to before stem elongation and flowering (8 weeks after sowing) in Iranian genotypes and even Mollasani genotype had significant higher DWR than control, but this trait was very significant lower than control at the second sampling (26 weeks after sowing), one month before harvesting .

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**EFFECT OF EUGENOL IN THE CONTEXT OF ETHANOL TEAT
MICROBIAL LOAD ON DAIRY COW**

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So far, not research on the effects eugenol as an antiseptic and germicidal post milking teat deep (PMTD) in full has been made. The aim of this study was to investigate the effects of antibacterial and antifungal activity of eugenol in the context of ethanol to reduce the epidemic of contagious mastitis in dairy cattle [1]. In this study, 30 primiparous Holstein cows were used. Cows were randomly divided into three groups, with the control therapy with eugenol in the context of ethanol and ethanol groups. Of contagious mastitis in cows with CMT test were studied. Choosing negative examples for a month for the use of eugenol in the context of ethanol were sprayed. Every day before drug teat surface bacteria samples prepared. End of contagious mastitis infection in CMT test and control groups were analyzed. Data Analysis with SPSS software test and T-test was performed.

Average number of colonies of bacteria *Staphylococcus aureus* and *Streptococcus agalactia*, respectively, in the medium between the ethanol and control groups showed no significant difference ($P < 0/05$). The percentage difference between control and treatment groups with eugenol showed ($P < 0/05$). The above findings indicate that the treatment group than in the control group had a positive effect. Eugenol can damage the cytoplasmic membrane of bacteria *E. coli* bacteria, *Salmonella enterica*, *Staphylococcus aureus*, *Lactobacillus* is effective. Properties, antioxidant, antibacterial and antifungal activity of eugenol is effective in reducing mastitis [2].

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**THE EFFECT OF SLOPE DIRECTION ON MORPHOLOGICAL
CHARACTERISTICS OF *JUNIPERUS POLYCARPOS*.KOCH
NEEDELS**

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Plants in the genus *Juniperus* of the most important plants are growing. There are many biological and pharmacological properties. And in traditional medicine as a carminative, anti-bacteria and are used to treat indigestion. The active ingredients are extracted from the needles. Various factors such as gender or topographical factors such as the slope direction possible influence on morphological *Juniperus polycarpos* needles. The aim of this study was to investigate the morphological characteristics and the range of needles is influenced by gender. So Chaharbagh *Juniperus* habitat of Gorgan 6 males and 6 females from each of the slope direction (a total of 24 samples) were selected. Then scale morphological traits including length of apical needle, thickness of apical needle, length of right needle, thickness of right needle, length of left needle, thickness of left needle, number of needles on the 5 mm of the last ramification shoot, thickness of the last ramification shoot with needles with a microscope bini collar with a magnification of 4 and resolution 0.04 mm were measured. This study tested the factorial in a completely randomized design with 6 replicates were performed in each slope direction, and gender. Results of two-factor factorial experiment showed that in contrast the two genders in all traits except length of right and left needles are not significantly different. With a view to expand and gender interaction was observed only in characters length of apical needle, , length of right needle, thickness of right needle, thickness of left needle, number of needles on the 5 mm of the last ramification shoot, thickness of the last ramification shoot with needles is meaningful needles.



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**EFFECT OF THYMOL AND CARVACROL ON TWO CULTIVARS OF
CUT GERBERA FLOWERS VASE LIFE**

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Gerbera flowers are well known for their variable shapes and colors and are one of the most popular cut flowers in the world. Regarding to economic importance of longevity of cut flowers. These cut flowers are sensitive to microbial contamination at the stem base and it cause shortening their vase life. This study was conducted to effect of essential oils on vase life of longevity of cut gerbera flowers ('Pink elegance' and 'Dalma' cultivars). Flowers were harvested from a commercial greenhouse and transported to laboratory with 22,23°C temperature and 60±5% relative humidity. Cut flowers were pulse-treated with carvacrol (0, 5, 10, 15, 20 mg L⁻¹) and thymol (0, 5, 10, 15, 20 mg L⁻¹) with 5 % sucrose. Every day morphology, fresh weight and vase solution uptake were recorded until appear senescence signal. Experiment was conducted in completely randomized design with 5 replications and 1 flower in each experimental unit. Based on the results, essential oils showed positive effects on the vase life of flowers. The longest vase life, highest solution uptake and relative fresh weight reduction of *Gerbera jamsonii* cv. Pink elegance and Dalmawas recorded from 20 mg L⁻¹ carvacrol treated flowers. There is no difference between vase lives of two cultivars. Considering the results and because of essential oils are organic natural substances, both safe and environmentally friendly, they can be used for increasing the vase life of cut flowers.



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INFLUENCE OF ARBUSCULARMYCORRHIZAL FUNGI AND SALT
STRESS ON ESSENTIAL OIL CONTENT OF SUMMER SAVORY
(*SATUREJA HORTENSIS L.*)

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Mycorrhiza is the mutualistic symbiotic relationship between fungus and plants root that can influence on quantity and quality of essential oil of medicinal plants [1]. A factorial experiment with completely randomized design was conducted under greenhouse to evaluate the effects of arbuscular mycorrhizal fungus on essential oil of summer savory (*Satureja hortensis L.*) under salinity stress conditions. The treatments consisted of 1) three levels of arbuscular mycorrhizal fungi (control, *Glomus intraradices* and *Glomus etunicatum*), 2) salt stress with four levels (0, 2, 5 and 8 dSm⁻¹ using NaCl). The results showed that as salinity stress levels increased, essential oil percent increased. This increase was higher in mycorrhizal plants than non mycorrhizal plants. This could be due to more efficient mycorrhizal plants compared with non mycorrhizal plants in salinity stress condition that may lead to increased growth and yield of plants.

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**INFLUENCE OF ARBUSCULARMYCORRHIZAL FUNGI ON
GROWTH AND MORPHOLOGICAL CHARACTERISTICS OF
SUMMERSAVORY (*SATUREJA HORTENSIS L.*) PLANT UNDER SALT
STRESS CONDITIONS**

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Adverse effects of salt stress on medicinal plants can be reduced in the growth and morphological traits of the plant [1]. Arbuscularmycorrhiza fungi as a biofertilizer have positive effects on the growth of medicinal plants under salt stress conditions. The purpose of this study was to evaluate the effects of arbuscularmycorrhiza fungi on plant growth of savory (*Satureja hortensis L.*) under salt stress conditions. The treatments consisted of 1) three levels of arbuscularmycorrhizal fungi (control, *Glomus intraradices* and *Glomus etunicatum*), 2) salt stress with four levels (0, 2, 5 and 8 dS m⁻¹ using NaCl). The results showed that increase of salinity stress levels made cause reduced in height, and shoot fresh and dry weights of plant and increased in root fresh and dry weights of plant. As the salinity stress levels increased, all measured parameters were higher in mycorrhizal than non mycorrhizal plants. In most cases, the effects of *G. intraradices* were superior to *G. etunicatum*.

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ANTIMICROBIAL ACTIVITY OF FIVE PLANT ESSENTIAL OILS ON
BACILLUS SP.

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In this study the antimicrobial properties of essential oils obtained from *Cinnamomum zeylanicum*; *Eucalyptus camaldulensis*; *Mentha piperita*; *Rosmarinus officinalis*; *Juniperus* sp. were examined. The essential oils were extracted of dried powder plants were chopped and subjected to steam distillation for 3 h using a Clevenger type apparatus. Antimicrobial activities were determined by disk diffusion testing. The essential oils of plants with different doses of (0.5, 2, 4, 6, 8 μ l) and three replicates were tested. The results showed that all the plants essential oils have antimicrobial effects. Between plant essential oils in the inhibition of bacterial growth, there was a significant difference. Most antimicrobial effects of plant essential oils *C. zeylanicum* and lowest antimicrobial effect of essential oil of the plant *E. camaldulensis* was. Between different doses of *C. zeylanicum*; the most effective dose was 6 μ l. The survey results showed that the essential oils of these plants can be considered as an antibacterial agent.

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**STUDY OF PROTECTIVE EFFECTIVE OF POLLEN IN PROPORTION
TO ROYAL JELLY ON LIVER TISSUE IN EXPERIMENTAL
POLYCYSTIC OVARY SYNDROME IN ADULT FEMALE RATS**

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polycystic ovary syndrome (PCOS) is one of the common clinical disorder that is observed among 5-10% women in their reproductive age. Clinical characteristics obtain: anovulation, hyperandrogenism, hirsutism, and resistance to insulin. Liver is one of the responding tissues to insulin that observed among 47% of PCOS patients as fatty liver disease[1,2]. Pollen as apicultural product is focused for human diet because of its nutritional value. Pollen are rich in flavonoid and phenolic compounds and including high antioxidant activity[3]. Royal jelly(RJ) contains many important compounds with biological activity, such as free amino acids, proteins, sugars, fatty acids, minerals and vitamins. RJ has several pharmacological activities, including vasodilative and hypotensive activities, antitumor activity, anti-inflammatory and antibacterial activity [4]. The aim of this research is to investigate the protective effect of pollen in proportion to RJ on liver tissue in PCOS rats. In this research, 48 adult female rats were divided into 6 equal groups randomly: 1) Control group: receiving just normal food and water; 2) PCOS group: intramuscularly injected by a single dose of estradiol valerate(0.4mg/rat); 3) RJ group: receiving 90 mg/kg Rj daily and 4) PCOS-RJ group; 5) pollen group receiving 150 mg/kg pollen daily and 6)PCOS-pollen group(receiving induced PCOS by second group method, treated with RJ by third group method. Treatment period was 63 days. At the end of treatment period, all animals were killed and the liver tissue of each animal for histological studies was dissected. The liver tissues were collected and immediately fixed with 10% buffered formalin, and embedded in paraffin. Sections (4–5 μ) were prepared and then stained with hematoxylin-eosin and sudan black dye for photomicroscopic observations.

royal jelly in proportion to pollen decreased lipid reserves in liver cells and decreases the effect of oxidative stress due to this syndrome in liver tissue in PCOS treated group with RJ. But necrosis in hepatocytes and prevascular inflammation had decrease in PCOS-pollen group in proportion to PCOS-RJ group in comparison with PCOS group. It could be concluded that RJ and pollen have a protective effects against oxidative stress in liver tissue of PCOS rats and this protection was dose dependent.

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**CURCUMIN NANOMEDICINE; APPLICATIONS OF
 β -CYCLODEXTRIN IN CURCUMIN SOLUBILITY ENHANCEMENT**

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Curcumin, a renowned herbal medicine, has anti-inflammatory properties and cause pain relief and reduction of inflammation pain in rheumatic patient. Its anti-cancer features have also been proved in literature [1]. But unfortunately, it is very hydrophobic and restricts therapeutic properties [1,2]. Many researchers have been reported for enhancement of hydrophilicity of curcumin [3]. In this research cyclodextrin has been used as the host molecule for improvement of curcumin solubility through hydrophobic/hydrophobic interactions of curcumin and interior sites of cyclodextrin. It could form a hydrophilic complex through inclusion complexation process. The main purpose of this research is to fabricate cyclodextrin-curcumin hybrid nanoparticles for increasing of curcumin aqueous solubility. Different species of β -cyclodextrin such as methyl β -cyclodextrin and hydroxypropyl β -cyclodextrin were used as host for drug solubility enhancement. The designed complex is introduced as a suitable nanomedicine substitution for curcumin. The structure was finally analyzed with SEM, NMR, DSC, TGA and FT-IR.

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INVESTIGATION OF THE EFFECTS OF DIFFERENT RATE OF
NITROGEN AND ZINC ON YIELD OF CHAMOMILE
(*MATRICARIA CHAMOMILLA* L.)

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In order to study the effect of (nitrogen and zinc soil and foliar application respectively) on chamomile (*matricaria chamomilla* L.) an experiment was conducted as a factorial experiment in completely blocks design with three replications in the growing season of 2011 at the medicinal plant farm of the Ramin Agriculture and Natural Resources University. Experimental factors was included; nitrogen (N) in four levels (Control, N₁: 50, N₂: 100 and N₃: 150 kg.ha⁻¹) from urea source and zinc (Z) in three levels (Control, Z₁: 2% and Z₂: 4%) from zinc sulfate source that applied as soil and foliar application respectively. Plant height, stem diameter, plant weight, shoot dry matter, flower weight, flower dry matter and flower number per plant were evaluated [1]. Results showed that zinc application had significant effect ($p \leq 0.5\%$) on shoot dry matter but no significant effect on stem diameter and significant effect ($p \leq 0.1\%$) on other parameters. Nitrogen application had significant effect ($p \leq 0.1\%$) on the all these characters. The highest and lowest flower yield were obtained in N₃×Z₁ (1150 kg.ha⁻¹), and N₁×Z₀ (280 kg.ha⁻¹) respectively. Results obtained of this experiment indicated that nitrogen and zinc application can be an effective method to increase flower yield of camomile but plant burning due to high concentration of zinc solution is a preventive factor to gain optimal flower yield.

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**PROTECTIVE EFFECT OF PARSLEY AQUEOUS EXTRACT VERSUS
GLYBURIDE ON DIABETES-INDUCED DERANGEMENT IN THE
OVARY; EVIDENCE FOR FOLLICULAR GROWTH AND
BIOCHEMICAL ALTERATION**

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Diabetes is considered as a metabolic disease which is characterized with high blood sugar in animal and humans. Diabetes-induced derangements in the ovary tissue are characterized by decreased normal follicles distribution and severe oxidative stress in ovarian tissue [1]. Glyburide (GLY) is an anti-diabetic drug (sulfonylurea-type) used along with a proper diet and exercise program to control high blood sugar. This compound works by stimulating the release of insulin. On the other hand some clinical reports indicate side effects for GLY including; nausea, heartburn, seizures and allergic skin reactions [2]. Parsley has been reported to reduce the blood sugar with no reported side effects [3]. Therefore, the current study was designed to uncover the protective effect of aqueous extract of parsley (PE) and GLY on diabetes-increased follicular atresia, nitrosative and oxidative stresses. Twenty four mature female mice were divided into 4 groups (n=6 in each group) as control-sham, streptozotocin-induced diabetic animals, parsley-treated diabetic group and GLY-received diabetic mice. The animals in test groups received STZ (70 mg⁻¹/kg⁻¹, for 3 days continuously), PE (2 g⁻¹/kg⁻¹ per day, orally) and GLY (50 mg⁻¹/kg⁻¹ per day, orally) for 28 days. The animals in the control-sham group received citrate buffer in the same volume used for STZ solution. The normal follicular count performed based on follicles stage of growth (preantral and antral), the tissue nitrite oxide (NO) and malondialdehyde (MDA) levels were evaluated. Histological examinations demonstrated that, the PE-received animals showed significantly increased number of normal follicles in both stages of preantral and antral in comparison to the diabetic rats. Although the GLY-administrated mice showed remarkably (P<0.05) higher numbers of normal preantral and antral follicles versus diabetic mice, no significant (P>0.05) differences observed between PE and GLY-received animals. Biochemical analyses revealed that the PE administration significantly (P<0.05) decreased tissue NO and MDA levels compared to diabetic mice. No significant differences were found between PE and GLY groups for NO and MDA levels. *In conclusion*, PE can fairly protect ovarian tissue and reduce follicular atresia by lowering blood sugar. Moreover diabetes at least partly by inducing oxidative and nitrosative stresses exerts its pathologic impact, by which, PE could down-regulate oxidative and nitrosative stresses similar to GLY.



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**PHYTOCHEMICAL SCREENING, ANTIOXIDANT AND BURN
HEALING POTENTIAL OF *GALIUM ODORATUM*
ETHANOLIC EXTRACT**

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Galium odoratum (L.) Scop. from Rubiaceae family is naturally distributed in various regions in the north of Iran. Aerial parts have been used as a treatment for nervous agitation and circulation disorders and the bruised leaves have been applied topically to reduce inflammation and improve wounds healing [1, 2]. This study was conducted to evaluate the antioxidant and burn wound healing activity of methanolic extract of *G. odoratum*. The total extract was prepared from aerial parts of the plant by methanol/water (80/20). An attempt was made to observe the presence or absence of different phytochemical constituents in the extract qualitatively [3]. The antioxidant potential of the extract was assessed by 1, 1-diphenyl-2-picryl-hydrazyl (DPPH) assay [4]. Deep second degree burns were induced in four groups of six rats each. Groups 1 and 2 received eucerin and silver sulfadiazine as control and reference standard and groups 3 and 4 were given methanolic extract of 15% and 30% (w/w in eucerin base) respectively. The topical treatment was done daily for 14 days. The percentage of wound contraction and histology parameters of healed wounds were observed.

The extraction procedure yielded 29.83% (w/w) for methanolic extract. The results of phytochemical screening tests were positive for flavonoids, tannins, saponins and anthraquinones. The extract exhibited a good and notable dose dependent DPPH scavenging activity with IC₅₀ of 148 µg/ml. There was statistically significant improvement in wound contraction of animals treated with both concentration of methanolic extract in comparison to control (p<0.05). The healed wounds in extracts-treated animals contained less inflammatory cells and had better re-epithelialization. Wound contraction and histology parameters were relatively better for higher concentration.

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EVALUATION HYDROALCOLIC EXTRACT OF *PLANTAGO MAJOR* LEAF ON SPERM COUNT AND FSH, LH LEVELS IN STREPTOZOTOCINE (STZ) INDUCED DIABETIC RAT.

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Use of medicinal plants in treating diabetes is clinically very important. We decided to assess the effect of extract of *Plantago major* on sperm count and FSH, LH levels in diabetic rats. **Materials and Methods:** Twenty-four male rats were divided into 3 groups as follows: 1- Group control (C). 2- Group Diabetic (D) received STZ, 65 mg/kg bw /i.p [1], 3-Group diabetic+*Plantago major*. The experimental groups received *P. major* (100 mg/kg bw) by intraperitoneal injection for 6 weeks. Then 6 weeks of study, fasting blood samples were collected and serum of FSH measured. All the rats were sacrificed and testes were removed and sperms were collected of epididymis tail [2], then their numbers were assessed. Data were analyzed using ANOVA and SPSS. **Results:** Results showed that diabetes caused a significant decrease in sperm count and FSH, LH levels were compared to other groups. Administration of *p.major* extract in diabetic rats restored these changes towards normal group. Extract of *P. major* leaf has beneficial effects on the testicular tissue.

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THE EFFECTS OF *BOSWELLIA SERRATA* GUM RESIN ON LIPID PROFILE IN HYPERLIPIDEMIC TYPE 2 DIABETIC PATIENTS: A RANDOMIZED DOUBLE-BLIND PLACEBO-CONTROLLED CLINICAL TRIAL

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Boswellia serrata gum resin is commonly used in traditional system of medicine in variety of diseases including diabetes mellitus. The hypoglycemic effects of *Boswellia serrata* gum resin has been reported in clinical trial and its favorable effect on lipid profile has been documented in experimental study. The present study was performed to investigate the effects of *Boswellia serrata* gum resin on lipid profile in hyperlipidemic type 2 diabetic patients. Total 56 hyperlipidemic type 2 diabetic patients were randomly assigned into two groups of 28 patients. In first group patients received two capsules of 250 mg of *Boswellia serrata* gum resin and other group received two capsule of 250 mg tasted powder as placebo for two months. The fasting blood glucose, total cholesterol, LDL, HDL and triglyceride levels and liver and renal function tests were determined at the baseline and after two months of the study. The results showed a significant decrease in fasting blood cholesterol ($p=0.035$) and triglyceride levels ($p=0.002$) in *Boswellia serrata* gum resin treated group as compared to control group at the end of the study. No liver, kidney and other side effects were observed in these two groups. Treatment of hyperlipidemic type 2 diabetic patients with 500 mg *Boswellia serrata* gum resin daily for two months improves lipid profile without any adverse effects(1,2).

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**THE EFFECT OF INDOLE BUTYRIC ACID (IBA) AND
NAPHTHALENE ACETIC ACID (NAA) ON STEM CUTTINGS OF
MYRTLE (*MYRTUS COMMUNIS* L.)**

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Myrtle (*Myrtuscommunis* L.) is an evergreen shrub which grows spontaneously in the Mediterranean area. It has been well known for the antioxidant, antifungal and antiviral and anticancer properties. In this study, the effects of different concentration of IBA and NAA on hardwood and semi hardwood cuttings of myrtle were examined. The concentration of IBA and NAA were 0 (control), 250, 500, 1000 mg/l. Treatments were evaluated in split factorial on completely randomized design (CRD) with three replications. Cuttings were assessed for rooting and shooting percentage, number of roots and leaves, length of longest root and shoot length. Hardwood cutting showed higher rooting and shooting percentage than semi hardwood cutting. Result showed that cuttings rooted best when treated with 500 ppm IBA or 250 ppm NAA. The highest shoot percentage was observed in cuttings which treated with 500 ppm IBA or NAA. Stem cuttings treated with 500 ppm of IBA or NAA also gave the highest shoot length, root and leaf numbers. The longest root length was observed in cuttings treated with 250 ppm NAA or 500 ppm IBA. The composite treatment of 500 ppm IBA and 250 ppm NAA was recommended for propagation of myrtle.

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**EFFECT OF HYDROALCOLIC EXTRACT OF *DESCURAINIA SOPHIA*
SEED ON SPERM MORPHOLOGY AND FSH, LH LEVELS IN
STREPTOZOTOCINE (STZ) INDUCED DIABETIC RAT**

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Diabetes is associated with changes in testicular tissue. We decided to assess the effect of extract of *Descurainia sophia* on sperms morphology and FSH, LH levels in diabetic rats. Twenty-four male rats were divided into 3 groups: 1- Group control (C), 2- Group Diabetic (D) received STZ, 65 mg/kg bw /i.p [1], 3- Group diabetic+ *D. sophia*. The experimental groups received *D. sophia* seed (100 mg/kg bw) by intraperitoneal injection for 6 weeks. Then 6 weeks of study, fasting blood samples were collected and serum of FSH measured. All the rats were sacrificed and testes were removed and sperms were collected of epididymis tail, then their morphology was assessed [2]. Data were analyzed using ANOVA and SPSS. Results: Results showed that diabetes caused a significant increase in abnormal sperm and a significant decrease in FSH, LH levels were compared to group treated with *D. sophia* seed. *Descurainia sophia* seed has medicinal properties effective on damage diabetes in the testicular tissue.

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**DETERMINATION OF TOTAL PHENOLIC, FLAVONOID CONTENTS
AND INHIBITORY EFFECT OF *EUPHORBIA SPINIDENS*
METHANOLIC EXTRACT AGAINST HSV1**

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There is a need to search for new compounds for treatment of viral infections since there is an increasing resistance to antiviral drugs[1]. The genus *Euphorbia* is the largest in the Euphorbiaceae family, comprising more than 2000 species. Some species of the genus *Euphorbia* have been used as medicinal plants for the treatment of types of diseases[2]. Therefore the objective of this study was determination of total phenolic, flavonoid contents and inhibitory effect of *Euphorbia spinidens* methanolic extract against HSV1. In this research, dried methanolic extract of aerial parts of *Euphorbia spinidens* that collected from the Khorasan state in North East part of Iran was used for different tests. The antiviral and cytotoxic effects of crude extract on Vero cell monolayers were determined by quantifying the Vero cell viability by using MTS assay[3]. Total phenolic and flavonoid contents of *E. spinidens* methanolic extract were evaluated by using Folin-Ciocalteu method and aluminum chloride colorimetric method respectively[4]. The statistical data were analyzed by using Probit analysis and t-test. The phenol content in the *Euphorbia spinidens* methanolic extract was 49.66 ± 1.527 mg/g and the flavonoid content in the extract was 40.33 ± 0.9966 mg/g. Based on Probit analysis, CC₅₀ and EC₅₀ of the extract were 5.09 ± 0.063 mg/ml and 0.34 ± 0.003 mg/ml respectively. The findings of this study showed that *Euphorbia spinidens* methanolic extract has antiviral effect on HSV1. More works, such as clinical examinations are needed to unravel for the antiviral effects of this plant.

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**EFFECT OF SESAMEOIL (*SESAMUM INDICUM* L) ON SPERM
PARAMETERS IN STREPTOZOTOCINE (STZ)- INDUCED
DIABETIC RAT**

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Because diabetes mellitus is associated with impairment of testicular function, ultimately leading to reduced fertility, this study investigated the sperm Parameters the testes of rats injected with streptozotocin in diabetic rats. Wistar male rat (n=30) were allocated into three Groups control group (n=10) and Diabetic groups (n=20) that received 65 mg/kg (IP) streptozotocin (STZ)[1] which was subdivided to two groups of 10: STZ group and treatment group Treatment group received 100 mg/kg of *S .indicum* daily for 6 weeks, the control group just received an equal volume of distilled water daily. All the rats were sacrificed and testes were removed and sperms were collected of epididymis tail, then their parameters was assessed [2, 3]. Data were analyzed using ANOVA and SPSS. Results showed that diabetes caused a significant increase in abnormal sperm and a significant decrease in sperm count were compared to group treated with *S .indicum* . This study suggests that sesame oil (*S .indicum*) can be effective for sperm healthy parameters in diabetic rat.

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**IMPROVEMENT IN GERMINATION AND SEEDLING GROWTH OF
HYOSCYAMUS SQUARROSUS GRIFF.**

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Seed quality remarkably depends on dormancy, a major physiological process, as early domesticated and bred plants generally show lower dormancy than wild or new crops. *Hyoscyamus squarrosus* Griff. grows naturally in Iran, Pakistan and Afghanistan [1,2]. In these plant antimicrobial [1] and antioxidant activity [2] have been reported. In order to survey the effects of dormancy-breaking treatments on germination in *H. squarrosus*, a completely randomized design was implemented at four replications. Treatments were: GA3 soaking (500 and 1000 ppm), leaching, KNO3 soaking (0.3%), prechilling (4,8 weeks), GA3 soaking (500 or 1000 ppm)+leaching (24 h), GA3 soaking (500 or 1000 ppm)+ prechilling, prechilling +leaching and KNO3+leaching. Results showed significant differences between dormancy-breaking techniques. The highest germination rate and the lowest mean germination time belonged to 1000 ppm GA3+leaching and 1000 ppm GA3 treatments, respectively.

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**RECOGNITION AND USAGE OF MEDICINAL PLANTS ACCORDING
TO THE VIEWS OF LOCAL COMMUNITIES
(SAMPLE STUDYING OF TOP TALEGHAN IN ALBORZ PROVINCE)**

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In view of the increasing development of medical science and more recognition of the important medicinal plants from one side and utilizing the treasures of past ancients knowledge in cure of disease with aim of restores (revival) and conservation. This valuable information has been done to identify and evaluate (studying) the major Medicinal Plants in one of the local summer regions with the traditional rural area context in Alborz Province. The study area is Top Taleghan. According to the geographic range is 50°42' To 51°10' East Longitude and 36° 6' to 36°19' north Latitude with 55236 Hectares area that minimum height is 4120 meters and maximum altitude is 1840 meter with 650 mm average rainfall that is important for the treatment of diseases according to the local people archaism life which is related to the traditional livestock and agricultural systems and traditional medicinal plants using. In the region to seek special importance. Methods of work and study of these plants is done first by visiting the region and collaborative visiting and interview with local experts and most of the medicinal plants are identified in this stage. The medicinal property of each plant was determined from the perspective of beneficiaries and local experts. For more, by using reference books and authentic botanical books and information some aware Atari and was able to complete several medicinal properties and their usage in traditional medicine. Collections of plants are known families Genus species. The medicinal properties of identity, habitat, and parts used how to use locally provided in tabular format, including local information on medicinal plants of this region.



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COMPARISON OF MORPHOLOGICAL AND AGRONOMICAL TRAITS OF FENUGREEK (*TRIGONELLA FOENUM-GRACUM* L.) UNDER DROUGHT STRESS AND BIOSTIMULATORS IN GREENHOUSE AND FIELD CROPS

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To investigate the effects of drought stress and chemical fertilizer and bio-stimulators on morphological and agronomical traits of fenugreek, a factorial experiment was conducted on the basis of completely randomized blocks design with three replicates in Department of Cultivation and Development, Institute of Medicinal Plants, ACECR in Karaj, Iran in 2011. Treatment included drought stress with levels non stress (40%FC), average stress (55%FC) and Severe stress (70%FC) and fertilizer with levels control, aminoforte, Fosnutren, kadostim, humiforte, humiforte+50% (NPK), humiforte+100% (NPK). Results showed that the most chlorophyll and petiole length related to the combination treatment fosnutren with nonstress and most plant height, root dry weight, seed fresh weight, seed dry weight related to the combination treatment humiforte +100% (NPK) with severe stress and most, root fresh weight related to the combination treatment humiforte +100% (NPK) with nonstress in field. And in greenhouse conditions the most chlorophyll and petiole length related to the combination treatment humiforte+100% (NPK) with nonstress and most plant height, seed fresh weight, seed dry weight related to the combination treatment humiforte+50% (NPK) with severe stress and most, root fresh weight related to the combination treatment fosnutren with severe stress and most root dry weight related to the combination treatment kadostim with severe stress.



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**EFFECT DROUGHT STRESS AND BIOSTIMULATORS ON
MORPHOLOGICAL TRAITS OF FENUGREEK
(*TRIGONELLA FOENUM-GRACUM* L.).**

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To investigate the effects of drought stress and chemical fertilizer and biostimulators on yield and some quantitative characteristics of *Trigonella foenum-gracum*, a factorial experiment was conducted on the basis of completely randomized blocks design with three replicates in Department of Cultivation and Development, Institute of Medicinal Plants, ACECR in Karaj, Iran in 2011. Treatment included drought stress with levels non stress (40%FC) , average stress (55%FC) and severe stress (70%FC) and fertilizer with levels control(A), aminolforte(B), Fosnutren(C), kadostim(D), humiforte(E), humiforte+50% (NPK)(F), humiforte+100% (NPK)(G). Results showed that effect of fertilizer ×drought stress was significant ($P < 0.01$) on all of parameters of plant height, leaf length, leaf width, leaf fresh weight, Stem fresh weight, leaf dry weight, Stem dry weight. So that was the most plant height, leaf width, leaf fresh weight, Stem fresh weight, Stem dry weight related to the combination treatment humiforte+100% (NPK) +severe stress and most leaf length related to the combination treatment humiforte+100% (NPK)+ non stress and most leaf dry weight related to the combination treatment Fosnutren + non stress.



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**ENDOMETRIAL CHANGES IN PCOS FEMALE RATS THAT
TREATED WITH AQUEOUS FENNEL EXTRACTION.**

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PCO is characterized by infertility, oligomenorhea and hyperandrogenism, 75% women are infertile because of anovulation and if they become pregnant, early abortion happens at the first three months and implantation reduces [1]. Fennel is one of the herbals that are used for treatment of some diseases and it contains phytoestrogen with a protection effect on metabolic disorders [2]. The goal of this research was to find the therapeutic effect of fennel on endometrial thickness in PCO rats. In this research forty female rats divided into five equal groups were categorized in: 1) Control group: rats received jus food and water 2) Rats were gavaged by high dose fennel extract. 3) Rats were injected by Estradiol-Valerate for induction of PCOS, 4) Rats were injected by Estradiol-Valerate and treated with high dose fennel extract, 5) Rats were injected by Estradiol-Valerate and treated by low dose fennel extract. After one month, uterus were removed and prepared for microscopic studies. We determined the endometrial thickness and assayed it with SPSS. The results showed that endometrial thickness reduced in PCO group significantly but it increased in the PCO group that treated with fennel. There was not significantly difference in thickness of endometrial between control group and group treated with fennel. We know that the endometrial thickness is equally with pregnancy ratio [3]. And it reduced significantly in PCO group but fennel improved this reduction in that group and the high dose of fennel was more effective than low dose .We can suggest that fennel can be treat PCO although we need have more researches about that.

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EFFECT OF PRIMING ON SEED VIGOR AND ANTIOXIDANT ENZYMES ACTIVITIES IN THYME (*THYMUS VULGARIS* L.) UNDER SALINITY STRESS

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This study has been conducted in two experiments. In first experiment, the effect of priming on seed germination of thyme (*Thymus vulgaris*) was studied. This experiment has been conducted on the base of randomized complete design with four replications. Seeds of thyme primed with water (hydropriming) and PEG in -2, -4, -8 and -12 bar (osmopriming) for 6 and 12 h at 25°C and followed by air-drying to their initial moisture level. Hydropriming increased germination rate and shortened mean germination time (MGT) but had no effect on germination percentage, seed vigour index and seedling dry weight. Hydropriming enhanced the anti-oxidative enzymes of peroxidase and catalase. According to results, in second experiment, the effect of hydropriming on germination of thyme under salinity condition was studied. This experiment has been conducted in factorial experiment on the base of randomized complete design with four replications. The treatments were water salinity (Control, 4, 8 and 12 dS/m²) and type of seed (Control and primed seed). The results indicated that effect of hydropriming on germination of thyme under salinity condition was significant. According to the results in all of the salinity levels primed seed had higher activity of peroxidase and catalase, seedling dry weight, percentage and rate of germination than control seed. There is evidence that seed priming increased salinity tolerance of some plants [1,2].

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EFFECT OF POTASSIUM NITRATE ON SOME GERMINATION TRAITS OF BALANGO (*LALLEMANTIA ROYLEANA L.*) UNDER SALINITY STRESS

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In order to study effects of potassium nitrate and salinity stress on seed germination of *Lallemantiaroyleana*, an experiment was conducted. The factors of this experiment were including: application of KNO₃ levels (0, 0.2% and 0.5% %) and 4 NaCl (0, 2.5, 5 and 10 mM) that factorial combined in a completely randomized blocks design with three replicates. The results showed that the radicle length, radicle fresh weight, germination rate, germination uniformity were significant differences (in a statistical level of 5%). The best treatment of this study on seedling obtain in the radicle length, radicle fresh weight, germination uniformity indexes were 0 NaCl and 0.2% mM of KNO₃ level and in germination rate index were 2.5 NaCl and 0.5 mM of KNO₃.



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COMPARISON OF THE ESSENTIAL OIL COMPONENTS IN
WILD AND CULTIVATE POPULATION OF *SALVIA LACHNOCALYX*

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The genus *Salvia* with over 900 species is probably the largest member of the family *Lamiaceae* [1], Fifty eight annual or perennial species of the genus are found in Iran of which 17 are endemic. [2] *S.lachnocalyx* is one of the endemic aromatic species in Iran. *Salvia* species are generally known for their multiple pharmacological effects including their antibacterial, antiviral, antioxidative, antidiabetic, cardiovascular, anti tumor and anti cancer [3]. This investigation was carried out for investigation the changes of quantity and quality of essential oil of *S. lachnocalyx* in wild and cultivated plants for the first time. Aerial parts of *S.lachnocalyx* were collected in full flowering stage from natural sites in Eghlid (Fars province) and cultivated in research farm of Sadra city in Fars province in 2012. The essential oils obtained by hydro-distillation of dried aerial parts and analyzed by GC/MS. In cultivated plants 31 constituents, representing 99.9% of the oils, respectively, were identified. bicyclogermacrene (40.7) (E)-caryophyllene (11.1), spathulenol (9.3), δ -elemene (6.3), α -Pinene (5.1), germacrene D (3.9), β -pinene (3.8) were found to be the major constituents. In wild plants 36 constituents, representing 99.9% of the oils, respectively, were identified. bicyclogermacrene (18.1), α -pinene (15.3), β -pinene (13.5), sabinene (12.9), α -terpinyl acetate (7.7), spathulenol (5.6), (E)-caryophyllene (5.3), limonene (3.6) and germacrene D (3.2) were found to be the major constituents.

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EFFECT OF IRRIGATION INTERVALS ON YIELD AND YIELD COMPONENTS OF DEGEN & DRFI (*SECURIGER SECURIDACA* L.)

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Degen & Drfi is a plant that has medicinal and nutritional importance. Degen & Drfi and countless of plants in this genus had application for medicinal uses such as weight loss and diabetes control. Its seeds also contain protein and lipids as well as some starchy foods are consumed. In order to investigate the effect of irrigation regime on agronomic characteristics of Degen & Drfi a field experiment carried out in region KAHI of Iran, 2010. Experiment was conducted using randomized complete block design with four replications. Irrigation regime, including: six, twelve and eighteen days' intervals. Analysis of variance showed that irrigation regime was significant on flower number and grain yield at 5% level and for plant height, number of seeds per pod, number of pods per plant, total yield, biomass and harvest index (HI) at 1% level and was not significant on the number of stems per plant. It was the highest Number of seeds per pod with average 7/9 of the 12 days treatment and was lowest with average 6 on irrigation interval every six days. The results Showed were obtained highest biomass and harvest index from irrigation in 12 days interval with average 97/5 (g/m²) and %24/5 respectively. The highest amounts yield was gained from 12 days interval irrigation. According to test results, indicators of climate, soil, water and soil characteristics of the study area and eventually get out of the water in the root zone can be expected that irrigation in 12 days is the best treatment for Degen & Drfi production.

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**THE ANATOMICAL PROPERTIES OF *ALYSSUM*
(SECT. *GAMOSEPALUM* DUDLEY)**

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The genus *Alyssum* L. includes about 230 species around the world. Ninety species were represented in Turkey and 50 are endemic (Davis, 1985; Dudley, 1964; Ball & Dudley, 1964). The genus has divided to 5 sections on the basis of morphological properties (Dudley, 1964). *Meniocus*, *Psilonema*, *Alyssum*, *Odontarrhena* and *Gamosepalum* (Dudley, 1965). Section *Gamosepalum* was separated into 2 Series, according to indumentums type: *Connata* Dudl. and *Libera* Dudl. (Dudley, 1964). This section are consists 10 species included: *A. lepidoto-stellatum* (Hauskn. & Bornm.) Dudley, *A. tetrastemon* Boiss., *A. paphlagonicum* (Hauskn.) Dudley, *A. thymops* (HUB.-Mor & Reese) Dudley, *A. baumgartnerianum* Bornm.x, *A. sulphureum* Dudley & Hub- Mor, *A. corningii* Dudley, *A. harputicum* Dudley, *A. niveum*. *A. lycaonicum* (Schulz) Dudley. In this study *Alyssum*, sect. *Gamosepalum* was explored in terms of Anatomical aspects. Transversal sections of peduncle belong to 8 species of sect. *Gamosepalum* from two *libera* and *connate* series has examined in qualitative and quantitative characters. Vascular bundle type was bicolaterale in all species. In sum, Anatomical properties were explained. On the basis of anatomical properties dividing section in two series was accepted.

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COMPARISON OF THE ESSENTIAL OIL COMPONENTS IN WILD
AND CULTIVATE POPULATION OF *SALVIA VERTICILLATA*

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Salvia verticillata is one of the species of *Salvia* genus that is a member of the family *lamiaceae* with more than 900 species all over the world. These plants widely grow in some parts of Iran such as Mazandaran [1], Gilan [2] and Ghazvin. It has been used as medicinal plant for reducing blood sugar, antiseptic and anti seizure [2]. This investigation was carried out for investigation the changes of quantity and quality of essential oil of *S. verticillata* in wild and cultivated plants for the first time. Aerial parts of *S. verticillata* were collected in full flowering stage from natural sites in Ghazvin province and cultivated in research farm of Sadra city in Fars province in 2012. The essential oils obtained by hydro-distillation of dried aerial parts and analyzed by GC/MS. In cultivated plants 51 constituents, representing 99.99% of the oils, respectively, were identified. (E)-Caryophyllene (17.8), β -Phellandrene, α -Humulene (10.2), α -Pinene (5.7), Germacrene D (5.2), β -Pinene (4.8), Sabinene (4.5), 1,8-Cineole (4.4), Caryophyllene oxide (4.01), Bicyclogermacrene (3.9), α -Gurjunene (3.5), Myrcene (3.02) were found to be the major constituents. In wild plants 64 constituents, representing 100.00% of the oils, respectively, were identified. (E)-Caryophyllene, α -Gurjunene (12.8), Germacrene D (8.7), α -Humulene (7.7), β -Phellandrene (6.6), β -Pinene (6.5), Bicyclogermacrene (6.4) were found to be the major constituents.

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COMPARISON OF THE ESSENTIAL OIL COMPONENTS IN WILD
AND CULTIVATE POPULATION OF *SALVIA VIRGATA*

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Salvia genus belongs to the subfamily *Nepetoideae* of *Menthae* tribe in Lamiaceae family [1]. Numerous species of the genus *Salvia* have been used since ancient times in folk medicine and have been subjected to extensive pharmacognostic research intended to identify biologically active compounds [2,3]. These species have been found to possess significant biological activities, including antibacterial, antiviral, adstringent, antitumor, spasmolytic, antioxidant, anti-inflammatory, antihydrotic activity and have been also used in the treatment of mental, nervous and gastrointestinal conditions [2,4]. This investigation was carried out for investigation the changes of quantity and quality of essential oil of *S.virgata* in wild and cultivated plants for the first time. Aerial parts of *S.virgata* were collected in full flowering stage from natural sites in Sepidan (Fars province) and cultivated in research farm of Sadra city in Fars province in 2012. The essential oils obtained by hydro-distillation of dried aerial parts and analyzed by GC/MS. In cultivated plants 46 constituents, representing 100% of the oils, respectively, were identified. (E)-Caryophyllene (37.0), Caryophyllene oxide (15.2), Phytol (6.1), Spathulenol (5.0), Germacrene D (4.0), Sabinene (3.9) were found to be the major constituents. In wild plants 45 constituents, representing 100% of the oils, respectively, were identified (E)-Caryophyllene (38.9), Caryophyllene oxide (18.6), Bicyclogermacrene (9.0), Spathulenol (7.4), Phytol (4.0), Germacrene D (3.3) were found to be the major constituents.

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**THE EFFECT OF DIFFERENT KIND OF SALT ON SEED
GERMINATION AND SEEDLING GROWTH OF *NIGELLA SATIVA* L.
AND *GUIZOTIA ABYSSINICA* CASS.**

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Black cumin and Niger due to high rates of oil in seed and a variety of therapeutic effects, as medicinal plants oil are considered [1,2]. To investigate the effects of different kind of salts, NaCl, KCl, CaCl₂, KNO₃, K₂SO₄ with 0 and 50 mM concentrations on germination of Black cumin and Niger seed, a factorial experiment was performed in a completely randomized design with 3 replications. In this study, germination and seedling growth traits including seed germination percent (physiological and ISTA definition), germination rate, average days to complete germination, germination index, vigor index, root and shoot length, root and shoot dry weight were measured. Data analysis showed that the effect of salt on most of the measured traits were significant. Black cumin was more sensitive to salts types than Niger (%64.8 and %94.9 respectively). Also comparison of salt concentration treatments showed, by increasing salt concentration, all traits were significantly reduced. In treatment types of salt. Maximum reduction in parameters, was happened in K₂SO₄ and CaCl₂ and minimum reduction in salts KCl and KNO₃. Comparison of characteristics of two plants (Black cumin and Niger) showed that these two species of medicinal plants-oil have different germination behavior.

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**HIGH-FREQUENCY *IN VITRO* DIRECT SHOOTS REGENERATION
FROM AXILLARY NODAL AND SHOOT TIPS EXPLANTS OF CLARY
SAGE (*SALVIA SCLAREA* L.)**

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Medicinal plants have long been the subject of human curiosity and need. The use of medicinal plants for health reasons started thousands of years ago and is still an apart of medicinal practice in all countries of the world [1]. The genus *Salvia* consists of many species, which have wide applications in folk medicine and also many commercial uses, especially in the production of essential oils and flavoring agents. *Salvia sclarea* L. (Clary sage) is an example of such species. This plant, occurring in the Mediterranean basin and Iran [2]. *In vitro* bud induction and shoot regeneration of *Salvia sclarea* L. was investigated using shoot tip and axillary nodal explants. Bud induction and shoot regeneration were achieved on Murashige and Skoog (MS) media and sucrose supplemented with various concentrations of 6-Benzylaminopurine (BAP) and Thidiazuron (TDZ) (0, 2.2, 4.4, 8.8 μ M) alone or with Indole-3 acetic acid (IAA) (1.1 μ M). Significant difference was observed between treatments and explants ($P \leq 0.05$). In study of the effects of explants type maximum bud induction (average of 25.53) and shoot regeneration (average of 17.93) achieved in axillary nodal explants in medium supplemented with TDZ. Maximum shoot bud induction (37.18 bud per explants) observed in medium containing 4.4 μ M TDZ. Maximum shoot regeneration was in medium supplemented with 8.8 μ M of TDZ. Regenerated shoots were excised and rooted on $\frac{1}{2}$ MS and MS media fortified with different concentrations of IAA and IBA (0, 0.5, 1 mg l⁻¹) in four weeks. That MS medium supplemented with IAA (0.5 mg l⁻¹) established highest number of roots (Our results indicated 2.55 mean number of root). The maximum root length (5.65 cm) was recorded in control medium. The rooted plantlets were acclimatized successfully in the greenhouse with a survival rate of 90%.

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ESSENTIAL OIL COMPOSITION IN *STACHYS BYZANTINA*
CULTIVATED IN IRAN

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The genus *Stachys* which belongs to the *Lamiaceae* family is found in mild regions of the Mediterranean and in southwest Asia. This genus consists of 250 species widespread throughout the world. Among the 34 species present in Iran, 13 species are endemic [1]. *Stachys byzantina* K. Koch commonly known as 'lamb's ear' or 'lamb's tongue' or 'sonbolehenoghrehi or zabanehe bare' in Farsi, is one of the Iranian species of the genus *Stachys* L., and is found in the north and north-west of Iran [2,3]. Species of the genus *Stachys* including *S. byzantine* have been used as an anti-inflammatory, antitumor, anticancer, antispasmodic, sedative and diuretic agent, and in the treatment of digestive disorders, wounds, infections, asthma, rheumatic and inflammatory disorders, dysentery, epilepsy, common cold and neuropathy in traditional medicine [4-6]. This investigation was carried out for investigation the Essential oil Composition in *Stachys byzantina* cultivated in Iran for the first time. Aerial parts of *S. byzantina* were collected in full flowering stage from cultivated plants in research farm of Sadra city (Fars province) in 2012. The essential oils obtained by hydro-distillation of dried aerial parts and analyzed by GC/MS. In cultivated plants 45 constituents, representing 98.7% of the oils, respectively, were identified. α -Bisabolol (26.1), Cembrene (16.6), Germacrene D (12.9), β -Pinene, β -Elemene (6.6), Limonene (4.8), α -Pinene (3.6), epi-13-Manoyl oxide (3.4) were found to be the major constituents.

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ANTIOXIDANT ACTIVITIES OF THE BARK OF
PTEROCARYA FRAXINIFOLIA L.

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Pterocarya fraxinifolia L. from Juglandaceae family is an endemic Iranian plant growing in west-south of Caspian sea, northern Iran [1, 2]. This family is very noticeable for its different applications in industry, medicine and local uses [3,4]. Volatile oil and totalhydroalcoholic extract of the stem bark of *Pterocaryafraxinifolia* L. (Juglandaceae), collected in different seasons were examined for their antioxidant effects. Antioxidant activity was measured by two different methods (DPPH assay and β -carotene/linoleic acid test). Antioxidant activities for most samples for both volatile oil and extract were comparable to synthetic standard BHA. The results showed strong antioxidant activities for both essential oil and total extract of the samples which were comparable or even stronger than synthetic standard antioxidant BHT. Matching the results of total phenolics and antioxidant activity didn't exert any reasonable relationship which means its activity is most due to other unknown components. *May* and *July* essential oil samples showed stronger radical scavenging activity than BHT (12.06 ± 1.01 and 19.21 ± 1.43 , respectively compared to 19.72 ± 0.71 for BHT) but inhibition of lipid peroxidation was weaker than synthetic one. Total hydroalcoholic extract of the samples showed inhibition percentages of lipid peroxidation (ranging from 76.35 ± 0.92 for *September* sample to 86.84 ± 0.66 for *September* sample) comparable to that of BHT (95.32 ± 1.22). The noticeable antioxidant activity of the extracts suggests the presence of secondary metabolites with readily abstractable hydrogens.

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**ISOLATION AND PURIFICATION OF TERPENOIDS FROM AERIAL
PARTS OF ECHINOPHORA CINEREA**

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Echinophoracinerea is a plant of Apiaceae family, native to central Iran, and is scattered in mountainous areas. E.cinerea has been used as spice and herbal remedy. Various extract of this plant have shown antimicrobial and cytotoxic effects. Regarding the wide traditional use of this plant and deficit of study on its secondary metabolites, the phytochemical investigation seems to be necessary. Aerial parts of E.cinerea were extracted with acetone and the concentrated extract was fractionated by vacuum liquid chromatography on RP-18. The fractions were refractionated with both normal and reverse vacuum liquid chromatography. The subfractions were purified by HPLC to render pure materials. The structures were elucidated with 2D-NMR and mass spectra. Several terpenoids including glycosides were isolated and purified, and structures elucidated. Since these compounds have biological active functional groups, the plant can be used as a source of pharmacologically active phytochemicals.

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INDUCTION OF SALT STRESS RESISTANCE IN *FOENICULUM VULGAR* BY APPLICATION OF HYDRO AND HALO SEED PRIMING

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Foeniculum vulgare Mill. (Fennel) is a famous medical plant which is widely used in pharmacological and candy industries. Seeds of Fennel are containing many important chemical compounds in which some of them have medical properties and other might produce toxic effects. Oil of fennel contains 4 % palmetic acid, 22 % oleic acid, 14 % linoleic acid [1]. Fennel seeds contains Anitol, Steragule, Vitamin A, B and C. Application of seed priming technique could improve seed germination and germination synchrony in many of crops [2, 3]. In this experiment we investigate the effects of seed halopriming with KNO_3 and hydropriming on *Foeniculum Vulgar* seeds under salinity stress. In order to improve germination characteristics in fennel seeds different concentration of KNO_3 (0.5, 1, 2 and 4 %) and distilled water as hydro priming were used with different duration of seed priming (8, and 24 hour). Salinity stress was 4, 8 and 12 mmohs/Cm which was prepared by salving NaCl in distilled water and checked with EC meter. Results of study showed that there is significant difference between prime seeds and non-primed seeds. Seed priming increased germination characteristics in fennel seeds under salinity stress ad this was more obvious in $ZnSo_4$ at 400 ppm concentration. By increase in salinity stress from 4 to 8 mmohs/cm drastically reduction was observed in germination characteristics. Using KNO_3 as a priming agent did not produced any considerable results. Based on our results it is suggested using seed enhancement treatments like seed priming could improve seed performance and hydropriming treatment is more simple and easy treatment than $ZnSo_4$ with 400 ppm concentration. So we choose Hydropiming for 24 hour as our suggested priming treatment for improving germination and germination characteristics of *Foeniculum Vulgar* under saline environments.

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CHEMICAL COMPOSITION OF STEM ESSENTIAL OILS OF
PTEROCARYA FRAXINIFOLIA L.

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PterocaryaFraxinifolia L from Juglandaceae family is an endemic Iranian plant growing wild in west-south of Caspian Sea, northern Iran [1, 2]. This family is very noticeable for its different applications in industry, medicine and local uses. This research is focused on the analysis results of volatile oils extracted through SDE apparatus and free-radical scavenging activity of this plant [3,4]. The volatile oil was investigated by gas chromatography (GC and GC/MS). The yields of volatile oil of different samples of stem of *Pterocaryafraxinifolia* L. for *May*, *July*, *September* and *November* were 0.31, 0.26, 0.23 and 0.34% (basis on dry weight of samples), respectively. Stem essential oils of *P. fraxinifolia* in each sample consisted of different types of terpenoids and even were different dramatically between different samples. Hexadecanoic acid (ranging from 6.04%-32.60% and most dominant in *May* sample), Germacra-4(15),5E,10,(14)-trien-1- α -ol (ranging from 2.25-8.47%), Helifolen-12-al D (7.37% in *May* sample and 2.00% in *July* sample) and Agarospirol (6.38% in *July* sample and 0.6% in *May* sample) are among major ones. Linolenic acid and methyl linoleate were only available in *September* sample (5.85 and 6.3%, respectively), while ethyl linoleate was found in *May* sample, but Lioneic acid was present in all samples in different amounts (ranging from 1.57-9.11%).

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**EFFECT OF SOWING DATE AND GROWING SEASON ON
AGRONOMICAL CHARACTERS OF ISFAHANIAN AND INDIAN
BLACK CUMIN**

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In order to investigate the effect of sowing date and growing season on crop characteristics of two genotypes of Black cumin (*Nigella sativa* L.) an experimental design was conducted in 2009-2010 with four replications in Khomeini Shahr in Isfahan province. The experiment conducted as a split-plot design in the basic of randomized complete blocks. Two genotype of Indian and Isfahanian Black cumin consider as the main plots and four sowing date include 16 Nov, 16 Dec, 6 Mar and 4 Apr as the sub plots. In this experiment: plant height, number of flowers per plant, number of seeds per plant, number of seeds per capsule, number of capsules per plant, number of infertility seeds per capsule, number of follicles per capsule, number of seeds in a follicle, 1000 seed weight, seed yield, biological yield and harvest index were measured. The results indicated that planting date, varieties and their interaction had significant effect on the most traits. Two varieties had significant differences in measured characteristics. The seed yield of Isfahan variety was 1238kg/ ha, because of its adaptability with the climate of Isfahan and seed yield of Indian variety was 924.9 kg/ ha in the first planting date. Also, late planting date led to decrease in the most traits related to yield and yield components.



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**EFFECT OF DIFFERENT VERMICOMPOST LEVELS AND ECOTYPE
ON GROWTH PARAMETERS OF BASIL (*OCIMUM BASILICUM* L.)**

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In order to study the effects of different vermicompost and ecotype on growth parameters of basil (*Ocimum basilicum* L.) in 2012 in research field of Agricultural college of Kermanshah branch of ACECR as factorial randomized complete block design was performed in three replication. Treatments were included three vermicompost levels (0, 5 and 100 ton/ha) and three ecotype (Kermanshah, Shiraz and Andimeshk). The results showed that the effect of vermicompost on plant height, fresh weight, dry weight, leaf number and leaf area was significant ($p < 0.05$). The effect of ecotype on inter-node distance, fresh weight, dry weight, leaf number and leaf area was significant ($p < 0.05$). Interaction between vermicompost and ecotype on fresh weight, dry weight, leaf number and leaf area was significant ($p < 0.05$). This study showed the highest dry weight yield per plant (16.92 g) on the Shiraz ecotype with application of 10 ton/ha vermicompost. Also there was no significant difference between the two ecotypes Shiraz and Andimeshk with application of 10 ton/ha vermicompost. The lowest dry matter yield (4.297 g) was obtained with Andimeshk ecotype and 10 ton/ha vermicompost in general, the results of these experiments indicated that the performances of both ecotypes (Kermanshah & Shiraz basil) were increased with increases levels of vermicompost. But the vermicompost couldn't influence growth and yield of Andimeshk ecotypes.

Therefore, it could be concluded that biological fertilizers may be considered as a suitable replacement for a lot of chemical fertilizers consumption in sustainable agricultural systems.



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**THE EFFECT OF BACTERIAL INOCULATION ON QUALITATIVE
AND QUANTITATIVE YIELD OF THE *ALOE VERA* PLANT**

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In the current study, an experiment was conducted in the agricultural year of 1390-91 with a design of randomized complete block with 8 treatments and 3 repetitions in pot planting in medicinal garden of Agricultural Research Center in Hamedan so that the effect of biologic fertilizers on growth, yield and qualitative characteristics of *Aloe vera* plant is examined. The treatments included: (A): *Azotobacterchroococcum* of strain 12, (B) *Pseudomonasflaescens* of strain 41, (C) *Azispriliumbrasilense* strain of, a combination of two bacteria (A+B) and (A+C) and (B+C) and also a combination of three bacteria under the study (*Azisprilium*+ *azotobacter*+ *Pseudomonas*) and control treatment (without using biologic fertilizer). The results suggested that employing *azotobacter* imposed the greatest impact on the length of the shrub, the weight of the mature leaf compared to the control treatment. The combination of three bacteria had the greatest effect on aloin and barbaloin in the gel compared to the treatment control. In sum, this study showed that utilizing biologic fertilizers play an effective and useful role in improving qualitative and quantitative traits of *Aloe vera* plant.

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TRITERPENE CONSTITUENTS OF *EUPHORBIA ERYTHRADENIA*
BOISS.

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The genus *Euphorbia* is the largest in the plant family Euphorbiaceae, comprising about 2000 known species and ranging from annuals to trees. In Iran about 70 species have been reported, 17 of which are endemic [1] that *Euphorbia erythradenia* Bioss. is one of the endemics [2]. Modern phytochemical and pharmacological studies have shown that this genus produces various compounds, which some of them possess cytotoxic, modularity of multidrug resistance, antiviral and anti-inflammatory activity as well as skin-irritant, tumor promoting, and proinflammatory properties [3]. Furthermore some species are used in folk medicines to cure skin diseases, gonorrhoea, migraines, intestinal parasites, and warts, and in Iran as a purgative [1]. Although the presence of several kinds of secondary metabolites including triterpenes, diterpenes, macrocyclic diterpenes, steroids, flavonoids, phenolics and aromatic compounds in *Euphorbia* species have been reported [1, 4], what highlights the genus *Euphorbia* is a unique profile of diterpenoid polyesters, often accumulated in relatively large amounts and generally occurring in complex mixtures based on the acylation of only a few polyol scaffolds with different acids. In particular, jatrophone, ingenol and lathyrane diterpenoids are attracting considerable interest as antineoplastic agents. In order to phytochemical evaluation of *E. erythradenia*, its aerial flowering parts were collected and extracted after drying with maceration method, that resulted in a green gum, which was defatted and was subjected to silica gel column chromatography, to render several fractions. Subsequently the richest fraction in terpenoids was chromatographed on a column of silica gel to afford subfractions. Some of them were injected into preparative HPLC and separated using a gradient system at detection wavelength of 270 nm. Pure compounds were inspected using TLC and their chemical structure were elucidated by spectroscopic methods. Finally two triterpene compound, oleanolic acid and cyloartanol, were identified.

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**EVALUATION OF THE EFFECT OF THREE BIOLOGIC
FERTILIZERS ON *ALOE VERA* PLANT**

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In the current study, the effect of three bacterial fertilizers on *aloe vera* plant was studied in pot planting and under greenhouse conditions. It is based on an experimental design of random complete blocks with 8 treatments and 3 repetitions. The treatments included: 1) inoculation with *Azisprilium brasilense* 2) inoculation with *Pseudomonas fluorescens* 3) inoculation with *Azotobacter chroococum* 4) inoculation with a combination of two bacteria 5) inoculation with a mixture of all three bacteria 6) treatment control. Statistical analysis revealed that *Azotobacter chroococum* had the greatest significant effect on the increase of traits such as average vitamin C, size of the complete leaf, the length of the shrub and the width of a mature leaf. The combination of the three bacteria had the greatest effect on the quantity of vitamin C in the gel. Therefore, our findings indicate a positive role plant-growth promoting rhizobacteria play in qualitative and quantitative yield of *Aloe vera* plant.

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**INTRODUCE SOME MEDICINAL PLANTS USED FOR GASTRO-
INTESTINAL DISEASES IN EAST-MAZANDARAN REGION**

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The fundamental relationship between plants and people is a common theme in accounts of the origin of humankind. Man provided foods and medicines, as well as other industrial materials from plants. One of the important usages of plants is about medicinal aspect and that how the people use of them in traditional manner in all over the world. Whereas traditional medicines are used by about 60 percent of the world's population so investigation in traditional medicine in different region is useful for various science and next surveys. In this research, that was taken two years, we investigated medicinal plants and traditional medicine for treatment of gastro-intestinal diseases in east-Mazandaran province. We recorded 20 species belong to 10 family of medicinal plant from tree cities in this area. Indigenous people prepare the plants in boiled, infusion, edible and dried form. Some of the plants are used for constipation, pain, flatulence and as carminative. In this paper we will introduce these plants and the manner of usage them by native people. At the end we will compare the indigenous effects of the medicinal plants with the other references [1-4].

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**HISTOPATHOLOGIC CHANGES IN RAT LIVER TREATED WITH
QUERCETIN EXTRACTED FROM ONION AFTER INFECTED BY
TOXOPLASMA GONDII**

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Quercetin is well established as an antioxidant *Flavonoids* and necessary for human health. It is found in different plants and fruits like onion, broccoli, and cranberries. Quercetin inhibits free radicals through the antioxidant function. In some recent studies shown that *quercetin* extracted from onion effect on liver tissue as an anti-inflammatory agent by means of balancing the hepatic enzymes like ALT and AST. There is less information about the histopathological changes in tissues with inflammation when they treated by quercetin. In this study 30 male wistar rat in age of eight months divided in three groups including; negative control group with one ml/day IP injection of physiologic serum, positive control with 0.5 ml/day IP injection of toxoplasma gondii tachyzoite solution and experimental group with 0.5 ml/day IP injection of toxoplasma gondii tachyzoite plus 15 mg/kg of body weight quercetin in their daily feed for 30 days. After one month rats were euthanized and sampling from livers completed. Tissues were fixed in 10% formalin, after tissue processing they were stained by hematoxyline and eosin. Slides were observed by light microscopes and histopathological changes after toxoplasma infection and treating with quercetin were evaluated in liver samples. Our data shown that *quercetin* could help in decreasing the inflammation and necrosis induced by toxoplasma tachyzoites in liver tissues that is in similarity with other study on balancing the hepatic enzymes in similar situation. These studies suggest that quercetin could be considered as an anti-inflammatory agent and easily find in plants and fruits.

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**EFFECT OF GROWING MEDIA ON ROOTING OF STEM CUTTINGS
IN HANA (*LAWSONIA INERMIS* L.)**

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Hanna (*Lawsonia inermis* L.) is one of the medicinal plants which have many health benefits due to having Lawsonone. One of the best methods of propagation is cuttings. Since rooting medium is one of the important factors affecting root formation of stem cuttings in plants, in this study the effect of 7 beds sandy soil, loam, peat, perlite, cocopeat and clay was investigated. Current study focused on best rooting medium for root formation from stem in November 2011. This experiment was performed with ten replications. Stem cuttings were placed in the beds after wounding the bottom of cuttings. After three months, the parameters of rooting percentage, the number of roots, the average of roots length, the percentage of ash, the root fresh and dry weight were measured. Results showed that the effects of growing media (75% sandy + 25% perlite) on rooting percentage were significant ($P < 0.001$). The highest stem lengths with mean of 16.69 cm and number stem with mean of 4.91 were recorded for (75% peat + 25% perlite) growing media. Effects of growing media were not significant on root fresh weight, root dry stem and root weight.

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**EFFECT OF COLCHICINES TREATMENTS ON SOME
MORPHOLOGICAL AND CYTOLOGICAL CHARACTERISTICS OF
*AGASTACHE FOENICULUM***

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Modern breeding methods have been developed to generate diversity and subsequently increase significantly the productivity of secondary metabolites in medicinal and aromatic plants. Among this methods, induce polyploidy is more important [1]. This study was used to evaluate the effects of polyploidy induction on some morphological and cytological characteristics in anise hyssop (*Agastache foeniculum*) plant under *in vivo* condition. Various concentrations of colchicines (0, 0.05, 0.1, and 0.2%) in three replications were used for 72 hours by applying dropping method. Some morphological and Cytological characteristics were investigated in green house regenerated plants. Tetraploid plants were identified by primary morphological selection such as (plant height, leaf length, leaf width, total chlorophyll content, leaf thickness, and leaf area.), studding stomata characteristics and finally using flow cytometric analyses. Comparison of characteristics of tetraploid plants with diploid (control) indicated that the higher level of ploidy in anise hyssop caused changes some morphological and physiological traits. 6 weeks after treatment, 100% seedlings survived. 84 days after the treatments morphological traits were examined. The induced polyploidy in *A. foeniculum* accompanied by, significant increase in leaf thickness, leaf width, stomatal size, leaf area, total chlorophyll content and decrease in plant height, leaf length and stomatal density that all these variables were observed in Concentration of 0.05% colchicine . Analysis of flow cytometric showed that amount of DNA increased in tetraploid plants compared to control (diploid plants).

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**ANTIRADICAL, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES
OF *CRATAEGUS ELBURSENSIS* EXTRACTS**

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Hawthorn shrubs belong to the *Rosaceae* family and the genus *Crataegus* and can be found in the northern part of Iran. At the present study, the antioxidant properties, total phenolic, flavonoid and anthocyanin contents in acetonic, methanolic and ethanolic (80%) extracts of Iranian Hawthorn (*Crataegus elbursensis*) fruits were examined. Acetonic extract exhibited the highest extraction yield for phenolic and flavonoid compounds and contained 100.75 mg gallic acid equivalents (GAE)/g extract and 2.14 mg quercetin equivalents (QE)/g extract, respectively, but methanol extract exhibited the highest extraction yield of anthocyanin compounds (1.44 mg cyanidin equivalents (CE)/g extract). Antioxidant activity of extracts was evaluated using two different methods, DPPH radical scavenging activity and reducing power of iron (III) assay which were then compared with BHT as a synthetic antioxidant. The two extracts showed various degrees of efficiency in each assay in a dose-dependent manner. The Hawthorn extracts had the highest antiradical activity in concentration of 250 and 500 ppm. These extracts exhibited remarkable reducing power. BHT and the acetone extract showed the highest antioxidant activity in both assays, respectively. Antioxidant activity of methanol and ethanolic extracts were the same ($P < 0.05$). Antimicrobial activity of the acetonic extract was determined against *Shigella dysenteriae* and *Escherichia coli*. The extract also showed good antimicrobial activity against tested bacterial. The most efficient bactericidal activity of the extract was against *Shigella dysenteriae* with MIC of 2.5 mg/ml. Results presented here may suggest that the extract of *C. elbursensis* possesses antimicrobial and antioxidant properties, and is therefore a potential source of antimicrobial and antiradical ingredients for the food and pharmaceutical industry. [1-4]

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**EVALUATION OF SOME SECONDARY METABOLITES IN THREE
OLIVE GENOTYPES AND TWO HARVESTING TIME**

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Olive (*Olea europaea* L.), a characteristic Mediterranean species, is one of the oldest agricultural tree crops worldwide, used to produce olives and oils. At present, the demand for olive oil is increasing, even outside the Mediterranean basin, mainly because it has a high level of oleic acid, which is one of the healthiest fatty acids [1,2]. Olive oil has a great variety of compounds including phenol and flavonoid. Polyphenols are antioxidant compounds that are able to absorb free radicals and protect the body against carcinogens. The experiment was conducted at the faculty of plant production in Gorgan University of Agricultural Science and Natural Resources. A complete randomized design with a factorial arrangement including three replications was used. In this investigation, total phenol and total flavonoids were measured in olives flesh. The genotypes that were used in this research included C₉, K₉ and D₉. Harvest index were 4.44, 5.06 and 4.3, respectively. Green and dark violet olives were harvested in two steps. Measurement of phenol and flavonoids and sample absorbance was read by a spectrophotometer. The result showed that, harvesting time and different genotypes had a significant effect on total phenol and total flavonoids. Based on LSD mean test, the highest total phenol content (0.372 mg GAE g⁻¹) was recorded in C₉ genotypes in second harvesting time and the lowest total phenol (0.211 mg GAE g⁻¹) was measured in C₉ genotypes in first harvesting time. The highest total flavonoids (0.409 mg QUE g⁻¹) was in K₉ genotypes in second harvesting time and the lowest total flavonoids (0.162 mg QUE g⁻¹) were in K₉ genotypes in second harvesting time. In general, flavonoids levels in all genotypes was higher in the first harvesting step (0.283 mg QUE g⁻¹) and phenol content was higher in the second harvesting step (0.326 mg GAE g⁻¹).

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**OVICIDAL ACTIVITY OF ESSENTIAL OILS FROM
THREE PLANTS AGAINST MOULD MITE
(*TYROPHAGUSPUTRESCENTIAE* SCHRANK)**

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The mould mite *Tyrophagusputrescentiae* (Schrank) can infest a wide range of foodstuffs, plant and animal material where environmental conditions are suitable. Likewise, it is considered to be a cosmopolitan stored product pest with significant economic damage [1]. Recently, Plant essential oils or their constituents have been considered to provide an alternative biopesticide to control stored-food mites [2]. It is well known that many of them are largely free from adverse effects and have excellent biological activity [3]. In this study, the fumigant toxicity of essential oils from pennyroyal (*Menthapolegium* L.), peppermint (*Menthapiperitha* L.) and rosemary (*Rozmarinusofficinalis* L.) were investigated against eggs of *T. putrescentiae* with five concentrations in four replicates. The essential oils were extracted using Clevenger-type water distillation. Experiments were carried out at 25±1°C, 75±5% relative humidity and full darkness condition. After 24h of exposure, lethal concentration at which fifty percent mortality (LC₅₀) for the essential oils from pennyroyal, peppermint and rosemary were 19.34, 16.52 and 17.72. µl/L air respectively. According to the lethal ratio test, there was no significant difference between LC₅₀ values among three essential oils.

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**ROLE OF MYCORRHIZAL FUNGI AND SALICYLIC ACID IN
RESISTANCE OF *OCIMUM BASILICUM* L. TO ALUMINUM TOXICITY**

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Aluminum stress considered as a limited factor on plants yield. Most research showed that inoculation of plants with mycorrhizal fungi and using salicylic acid increase tolerance of plants due to aluminum toxicity. The purpose of this study the role of mycorrhizal fungi in resistance green basil to aluminum toxicity. is In this study the effects of mycorrhizal fungi (*Glomus intraradices* and *Glomus mosseae*), salicylic acid 0.2 mM and chloride aluminum concentrations (0, 25 and 50 mM chloride aluminum) on tolerance of green basil (*Ocimum basilicum* L.) was investigated based factorial on completely randomized design. The results showed that aluminum caused increase Flavonoids and decrease anthocyanins in green basil plants. In pretreated plants with salicylic acid or inoculation with mycorrhizal fungi and on interactions between fungi with salicylic acid oxidant compounds increased that show activation of plant defense system.

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INVESTIGATION OF HISTOLOGICAL EFFECTS OF
HUMULUS LUPULUS ON OVARIAN TISSUE OF FEMALE THREE
SPOT GOURAMI

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The main objective of this study was to investigate the effects of histological *Humulus lupulus* on ovarian tissue of Three-spot gourami fish immature. Therefore, 70 female fish immature were evaluated. Then, the weight and length of fish were measured. The fishes were treated with extract of *Humulus lupulus* in different doses, separately. So, the two control groups were considered. The first control group was ethanol and the second group was intact. After 20 days, the fishes were anesthetized with PI222. Then, the length and weight of fish were measured and dissected. Thus the Ovarian weight of fish was measured and the samples were microscopic investigation. Comparison of the results of gonadosomatic index of significant difference between control and other treatments showed ($P < 0.04$) with increasing doses of such solution, the percentage of mature cells and increased the diameter of mature eggs were observed. Histological results showed that treatment of *Humulus lupulus* was more effective on induction of final maturation in three-spot gourami.

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**PHENOLIC ACID ANALYSIS AND ANTIOXIDANT ACTIVITY
DETERMINATION OF *FRORIEPIA SUBPINNATA***

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Plants constitute an important source of active natural compounds that differ widely in terms of their structure and their biological properties. In recent years, the prevention of cancer and cardiovascular diseases has been associated with the consumption of fruits and vegetables that are rich in natural antioxidants. The protective effects of plant products are due to the presence of polyphenols especially phenolic acids [1, 2]. The aim of this study was to assess the *in vitro* potential of methanolic leaf extract of *Froriepia subpinnata* as a natural antioxidant. The DPPH activity of the extract (10, 25, 50, 75, 100 and 200 l g/ml) was increased in a dose dependent manner, which was found in the range of 12.29–83.99% as compared to synthetic antioxidant of BHT 4.23–85.96%. The total amount of phenolic compounds in methanolic extract of was determined as gallic acid equivalents and total flavonoid content was calculated as quercetin equivalents from a calibration curve [3, 4]. The extract had high total phenolic and flavonoid contents. An analysis of phenolic acids in the leaves showed that chlorogenic acid was a major component. The results obtained in this study clearly indicate that *F. subpinnata* has a significant potential to use as a natural antioxidant agent.

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**STUDY OF ANTIMICROBIAL EFFECT *THYME* AND *MINT*
ESSENTIAL OILS AND EDTA, ON *STAPHYLOCOCCUS AUREUS***

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The use of essential oils of some plants in the food industry due to having antimicrobial, antioxidant and flavoring properties are growing. In recent years increasing antimicrobial effects of various vegetable oils with other antimicrobial agents has been of interest to researchers. In this study the antibacterial effects of essential oils of Thyme, Mint and EDTA on *Staphylococcus aureus* in vitro disk diffusion method and Broth micro dilution MIC testing was evaluated. Initially taken an average diameter (Mean \pm sd) of bacterial growth in disk diffusion method for essential oils Thyme, Mint and EDTA, respectively: (14.33 \pm 0.57), (12 \pm 0.00) and (18 \pm 1.00) mm was calculated. Also, MIC and MBC affect has been examined: Thyme (1/25, 0/62), Mint (1.25, 0.62) EDTA (1.66, 0.83) milligram per milliliter, respectively.



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**THE EFFECT OF CORN OIL ON LIBERKUHN GLANDS GOBLET
CELLS SECRETION ACTIVITY IN RABBIT**

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The recent investigations have shown the oils such as corn oil (as a PUFA) stimulate the cancer promotion specially colon cancer. This study was under taken to evaluate the effects of three regimens containing 10% corn oil on goblet cells of Liberkuhn glands of rabbit colon. Twenty-four rabbits were divided in to four groups. The first group took the regimen for one month, the second group for two months, the third group for three months and the fourth group were considered as control group with the regimen containing no corn oil. At the end of each regimen, biopsies from the colon of the subjects were examined using PAS and H&E staining methods. The results in each group were compared with the control. We observed that in the one-month and two-month regimen Liberkuhn glands were shorter than those of control were, but in the three-month regimen glands were the same as those of control were. We concluded that consumption of corn oil may induce some changes on the Liberkuhn glands and changes will be ceased by some adaptation mechanisms in long term diet [1, 2].

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**EFFECTS OF ELICITATION ON ALKALOIDS PRODUCTION IN
SUSPENSION CELL CULTURES OF *PAPAVER SOMNIFERUM***

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Elicitation is based on elicitor induced expression of defense related genes which results in increased synthesis of the secondary metabolites in plant or plant cell cultures. The effect of biotic elicitor, yeast extract, and nano elicitor, TiO₂ were studied on the production of the most important secondary pharmaceutically metabolites, antimicrobial benzo[c] phenanthridine alkaloids sanguinarine and the narcotic analgesic thebaine alkaloid in *Papaver somniferum* root and meristem suspension cell cultures. The amount of sanguinarine and thebaine were increased significantly 48h after elicitation by yeast extract elicitor in both meristem and root suspension cell cultures. However the amounts of increasing in meristem suspension cell cultures were faster than root suspension cell cultures. This nano particle had a significantly effect on accumulation of sanguinarine and thebaine in both cell suspension cultures 24 hours after elicitation. These elicitors acted positively on the pathway of thebaine production in meristem suspension cell cultures in which elicited it 100 percent higher than control (with no significant thebaine production in meristem cell suspension cultures). This study suggests that biotic and abiotic elicitors can regulate the production of benzylisoquinoline alkaloids and also describe the establishment of optimum conditions for root and meristem callus production in *P. somniferum*.

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EFFECT OF PLANT GROWTH REGULATORS ON *IN VITRO*
CULTURE OF *ARTEMISIA AUCHERI*

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Artemisia aucheri is a member of Compositae family. The plant has antimicrobial activity [1]. The plant essential oils contain many monoterpene compounds which are responsible for this activity. *Artemisia aucheri in vitro* cultures may produce an alternative to establishment of the plant. Therefore *in vitro* culture of the plant was established and the effect of plant regulators on fresh and dry weight of the plant was studied. *In vitro* culture of *Artemisia aucheri* were established by transferring leaf on solidified MS medium supplemented with different concentration of 2, 4 dichlorophenoxy acetic acid and kinetin. The best growth of plant was obtained from NAA 1mg/L, 2,4-D 2 mg/L, Kinetin 0.2mg/L and the less growth from treatment of NAA 1mg/L, 2,4-D 1 mg/L, Kinetin 0.1mg/L. It seems the plants growth regulator used for *in vitro* plant establishment can influence the plant growth in *Artemisia aucheri*.

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**EFFECT OF ECHINACEA EXTRACT ON PARENTERAL LYSOZYME
ACTIVITY IN SERUM OF BELUGA (*HUSO HUSO*)**

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Fish production in aquaculture industry is growing dramatically while some stress factors of typical problems in the industry and for improve health conditions in culture of aquatic organisms; recommended some strategies such as improving nutrition, water quality, and the use of vaccines, probiotics and immune stimulant. Largest families of Acipenseridae is *huso huso* or beluga, Due to the rapid growth and having special conditions, including having better and faster adaptation to artificial foods and concentrates having resistance to environmental conditions than other species has been much attention to grow. In this study, 45 number of *huso huso* with average weight 1.15 ± 20.82 kg were kept in Shahid Rajai reproduction, culturing and rehabilitation center of sturgeon and warm water fish for 12 days(August 2012). This fish were distributed randomly in the 2 groups with names Echinacea (2 repeats), and control. In first stage was injected intra peritoneally 400 mg / kgbw Echinacea that solution in 0/5 milliliters of sodium chloride solution in all fish. In control group 0/5 ml sodium chloride solution was injected intra peritoneally into each fish. . After injection were taken samples on days 0, 3, 6, 9, and 12 from the tail vein. after the getting blood, blood were poured into a non-heparinized microtube Immediately and to separate serum, blood kept 5 hours at 4 ° C and then were centrifuged for ten minutes at 2500 rpm. Serum lysozyme activity was studied in the Central Laboratory of Doctor Rastegar. Results of this study showed the maximum amount of blood lysozyme (372.93 ± 6.82) was in 12 day. Lysozyme also have a significant difference between values at days 3, 6, 9 and 12 with controlled treatment ($p < 0.05$). Also Lysozyme levels on days 3 and 12 showed a significant increase as compared to days 6 and 9 ($p < 0.05$). The results of this study showed that injection extract of Echinacea can increase the amount of lysozyme in *huso huso*.



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**SURVEY OF ANTIMICROBIAL EFFECT *THYME* AND *PEPPERMINT*
ESSENTIAL OILS AND EDTA, ON *SALMONELLA TYPHIMURIUM***

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The use of essential oils of some plants in the food industry due to having antimicrobial, antioxidant and flavoring properties are growing. In recent years increasing antimicrobial effects of various vegetable oils with other antimicrobial agents has been of interest to researchers. In this study the antibacterial effects of essential oils of Thyme, Peppermint and EDTA alone and in combination with each other on *Salmonella typhimurium* in vitro disk diffusion method and Broth micro dilution MIC testing was evaluated. Initially taken an average diameter (Mean \pm sd) of bacterial growth in disk diffusion method for oils Thyme, Peppermint and EDTA: (15.33 \pm 1.52), (12.33 \pm 0.57) and (14.66 \pm 1.52) mm was calculated respectively. Also, MIC and MBC affect has been examined: Thyme (0.62, 1.3), Peppermint (1.25, 2.5) EDTA (1.25, 2.5) milligram per milliliter, respectively.



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**TOTAL PHENOLIC CONTENT, ANTIRADICAL AND ANTIOXIDANT
ACTIVITIES OF *ERYNGIUM CAUCASICUM* EXTRACTS**

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Eryngium caucasicum as edible vegetable belongs to the *Apiaceae* family and the genus *Eryngium*, growing in the north part of Iran. In this study, optimization of extraction of total phenolic compounds from *Eryngium caucasicum* with traditional extraction method by two different solvents (Methanol and Ethanol), in two different concentrations (50 and 80%), two temperatures (25°C and 50°C) and during 24 hour were investigated. Total phenolic contents were determined by Folin-Ciocalteu assay and were expressed as mg of gallic acid per g of extract. The highest total phenolic contents were observed in 80 percentage concentration and temperature of 25°C extraction. In these conditions, total phenolic contents of ethanolic and methanolic extracts were obtained as 25.85 and 26.36 mg gallic acid equivalents (GAE)/g extract, respectively, ($P < 0.05$). Also, total flavonoid contents of extract were determined as 13.17 and 17.73 mg quercetin equivalents (QE)/g extract, respectively. Then the antioxidant capacity of extracts and also, BHT were assessed by DPPH radical-scavenging activity and total antioxidant capacity. Extracts showed antioxidant activity in a dose-dependent manner. Methanolic extract had more antioxidant activity than ethanolic extract. In total antioxidant capacity assay the extraction with the lowest EC_{50} value (96 $\mu\text{g/mL}$) had better antioxidant activity than BHT (140.22 $\mu\text{g/mL}$). Hence the *Eryngium caucasicum* can be used as a potential source of phenolic compounds and natural antioxidant and can be used in food formulation.

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**EFFECTS OF PLANT GROWTH REGULATORS ON CALLUS
FORMATION FENUGREEK
(*TRIGONELLA FOENUMGRAECUM* L) OF IN VITRO**

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Fenugreek (*Trigonellafoenumgraecum* L) is an annual plant from (leguminosae) family. This native crop is extending from Iran to northern India. Fenugreek leaves and seeds have been used extensively for preparing extracts and powders in medicinal performance. In Order to Study Callus Induction in Fenugreek (*Trigonellafoenumgraecum* L) an experiment was conducted in Ramin Agriculture Science and Natural Resources University during 2012. In this Paper to obtain callus, a factorial experiment in the form of randomized completely design with 12 treatments and 3 replications was carried out. The treatments consisted of different types of explants and media. The treatment of explant in three levels consisted of: hypocotil, leaf and root. While the treatment of media in four levels consisted of Murashig and Skoog (MS) media containing of (0.5, 1) mg/l 2,4-D and (0.1, 0.25) mg/l Kinetin. The results of analysis of variance showed that effect type explants, culture media and interaction was significant at the level of (0.01). The most of weigh callus was obtained in media culture with 1mg/l 2,4-D combination 0.1 kinetin with using hypocotil explants. While the lowest of weigh callus was produced in media culture with 0.5mg/l 2,4-D combination 0.25 kinetin with using root explants. It seems that hypocotil was the best explants in callogenesis of plant.

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**INFLUENCE OF DIFFERENT CONCENTRATION OF 2,4-D AND
KINETIN ON CALLUS FORMATION MILK THISTLES
(*SILYBUM MARIANUM*) PLANTS**

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The milk thistle *silybum marianum* (L.) gaernt in among the most ancient of all know herbal medicines. Various preparations of the plant, especially the fruits, have been used medicinally for over 2000 years to treat liver disorders. This experiment was conducted to study the effect of type of explants and media culture on callusing. Four media culture of Murashig and Skoog (MS) containing of (0.5, 1) mg/l 2,4-D and (0.1, 0.25) mg/l Kinetin and three type of explants was used. Experiment was carried out in a factorial in the form of randomized completely design with three replications. The obtained results showed the significant effect of explant and media culture and interaction on the weight callus. The most amount of induction callus was obtained using cotyledon explants on media culture with 1 mg/l 2, 4-D combination 0.1 Kinetin.

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**THE EFFECT OF NITROGEN FERTILIZER AND PLANT DENSITY ON
QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF
CASTOR (*RICINUS COMMUNIS* L.)**

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Castor (*Ricinus Communis*) is an oil plant that belongs to Euphorbiaceae family. Its oil is used in petrochemical industry, rubber factories, paint, varnish, soap, cosmetic products, alcohol, surface coverage and medicine. The Esters present in oil have a high viscosity and tolerate a vast range of temperature, so it is used as engine oil in airplane industry. In order to investigate the effect of density and nitrogen on quantitative and qualitative characteristics of castor an experiment as split plot was performed in Jiroft agriculture training center farm. In this experiment N was as main factor in four levels (N1=0, N2=45, N3=90 and N4=135kg pure nitrogen in hectare) and plant density was as secondary factor in four levels (D1=2, D2=4, D3=6, D4=8 plants per square meter). The experiment had three replications; in each replication were four plots that each of them was divided into four secondary plot. The results showed that adding 90 kg N in hectare had about 25-30 percent increase in seed production and 1-3 percent increase in oil more than other levels. The increase of density caused increasing the production; however, the amount of production in each plant was less than the level of 4 plants in square meter. The amount of oil in density of two plants in square meter because of absorbing more light and nutrients was more than other levels, but as it had low production was not acceptable. In interaction between N and density the best density and fertilizer level for seed production was 6 plants and 90 kg N in hectare. It was indicated that adding too much fertilizer and plant density had luxury aspect in inputs like fertilizer, seed and other cultivation cares.

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**EVALUATION OF GENETIC DIVERSITY IN SOME LINSEED
(*LINUM USITATISSIMUM* L.) GENOTYPES USING
EST-SSR MARKERS**

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Linseed (*Linum usitatissimum* L.), a multi-purpose crop, is cultivated as a rich source of oil, fiber and pharmaceuticals in the world. Information on genetic variation is important for breeding programs. This experiment was conducted to evaluate the genetic diversity of seven linseed genotypes (three Canadian genotypes, three local breeding lines and an American genotype) using 50 EST-SSR primer pairs. The number of alleles of 48 polymorphic marker loci ranged from 2 to 6 and the gene diversity was 0.24 to 0.81. Also, polymorphic information content (PIC) value ranged from 0.21 to 0.79 with an average of 0.48. The coefficient of similarity among genotypes ranged from 0.04 to 0.36. The result of cluster analysis based on genetic similarity matrix obtained from molecular data using UPGMA, divided genotypes into four groups. In this grouping genotypes from different countries were mostly segregated accordingly. However, the Canadian genotype of Flanders was grouped with Iranian lines. Also an Iranian line (KO37) was located in a separate group by itself. The results showed that EST-SSR molecular markers could be successfully employed for studying genetic diversity in linseed different genotypes.

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**TOXICITY EVALUATION OF THREE FORMULATED MIXTURES
BASED ON SOME ESSENTIAL OILS ON *TETRANYCHUS URTICAE*
KOCH (ACARI: TETRANYCHIDAE)**

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The two spotted spider mites, *Tetranychusurticae*Koch, is a well known economically important pest in many ornamentals and vegetables grown in greenhouses and fields all over the world [1]. Conventional method for control of this pest is through application of pesticides which has led to problems such as resistance developments secondary pest outbreaks, and environmental pollutions[2]. Recently, Plant secondary metabolites have received increasing attention as an important source to produce environmental friendly biopesticides[3]. In this study, lethal effects of threeformulated compositions based on herbal essential oils includingbakain 5% + peppermint 2% + rosemary 2% + pennyroyal 2% (T1), bakain 5% + peppermint 2% + rosemary 2% + eucalyptus 5% (T2) and bakain 5% + peppermint 2% + eucalyptus 5% + pennyroyal 2% (T3) were studied using leaf dipping method [4] on female adultsof *T. urticae*.Experiments were carried out at 25±1°C, 70±5% relative humidity and under a photoperiod of 16L: 8D. T3 was the most effective compound with the LC₅₀ value of 4.978 µl/mL.The LC₅₀ values T1 and T2 were 6.786 and 8.732 µl/ml, 24h after treatment, respectively. Based on the lethal dose ratio tests T3 had significantly different LC₅₀ value in comparison with T₂ with the ratio of 0.557 (95% CI = 0.430-0.721). In conclusion, T1 and T3 are recommended for further evaluations at field conditions. In addition we suggest they need to be tested on biocontrol agents, as well.

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**EFFECT OF ALTITUDE ON SOME OF THE MORPHOLOGICAL
CHARACTERISTIC AND CHLOROPHYLL CONTENT OF NETTLE IN
MAZANDARAN AND GOLESTAN CONDITIONS**

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Nettle (*Urticadioica*) is a medicinal plant from family of Urticaceae that cause low blood sugar, Reduce inflammation in rheumatoid, treatment of Bladder and urinary tract infections , Prostate and Acne. An experiment was performed in Golestan and Mazandaran. The experiment was based on a completely randomized block with factorial design in 5 replications and the attitude was 0 -2800. Analysis of variance of data showed significant differences in plants height, leaf length, leaf width, number of leaf per plant, size of inflorescence, the number of inflorescence per plant, root diameter, root length, the amount of chlorophyll. The experiments showed that in all factors the effect of altitude in province was significant. And with increase in altitude the size of plant, length and width of leaf become smaller and the number of flower and the amount of chlorophyll become more.



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**EVALUATION OF PRIMERS INDICES USED IN THE STUDY OF
GENETIC DIVERSITY OF *PAPAVER MACROSTEMUM* ECOTYPES
VIAISSR MARKER**

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Plants belong to the family of Papaveraceae have the varieties of alkaloids such as morphine, codeine and nicotine. Therefore the different aspects of breeding programs regarding plants in this family are considerable important [2,4]. A plant-breeding program, to be successful, needs a system to conserve and evaluate the genetic diversity [3, 1]. Using molecular markers including ISSR (Inter Simple Sequence Repeat) are the powerful tools in order to do the above stated issues. In this study, ISSR was used with the aim of assessment the genetic diversity among 14 ecotypes of *Papaver macrostemum*, collected from North Western of Iran. Seven primers have been applied in this study. All showed polymorphism amongst ecotypes. In other words, from 62 bands generated, all of them were polymorphic (100%). The different indices for the primer efficiency have been evaluated. The average of PIC (Polymorphism Information Content), EMR (Effective Multiplex Ratio), MI (Marker Index) and RP (Resolving Power) were 0.41, 1.90, 4.09 and 6.84, respectively. Primer UBC-112 showed the highest value of RP which is 13.42. For the EMR and MI, primer UBC-880 showed the value of 3.75 and 7.50, respectively which are the highest amongst all primers. Our results showed that, increasing PIC index leads to raise all other mentioned indices.

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STUDIES ON THE AMINO ACIDS, FLAVONOIDS AND TOTAL PHENOLICS IN ZIZIPHUS JUJUBA

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Ziziphus jujuba (Rhamnaceae) mainly distribute in the tropical and subtropical regions of Asia and have been employed as essential oriental folk medicine for thousands of years. Different parts of the plant could be used as remedies in insomnia, fever, diarrhoea, wounds and ulcer, in which the fruits were claimed to be beneficial to purify the blood and aid digestion. The mature and dry fruits of *Z. jujuba* are commonly used for the treatment of various diseases, such as anorexia, lassitude, insomnia, anxiety, etc. Their fruits possess nutritional and medicinal properties and are consumed fresh, dried and processed (jams, loaf, cakes, jelly, etc.) throughout the world. The objective of this study was to determine the total amino acid, total flavonoid and total phenolic contents in the peel and pulp of fruit *Z. jujuba*. The fruit were cleaned and carefully separated into peel and pulp using a stainless steel knife, dried and then ground into fine powders. The total amino acid content measured by ninhydrin reagent was 9.6% for peel and 6.9% for kernel. The total phenolic and total flavonoid contents were estimated by Folin-Ciocalteu's and aluminum chloride reagents. The total phenolic and total flavonoid contents were 1.6 and 0.1% for pulp and 1.2 and 0.05% for kernel, respectively.

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COMPARISON STUDY OF ANTIBACTERIAL EFFECT ESSENTIAL OILS *OREGANO* AND *CUMIN* AND EDTA ON *SALMONELLA TYPHIMURIUM* BY DISC DIFFUSION AND BROTH MICRODILUTION MIC TESTING

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The use of essential oils of some plants in the food industry due to having antimicrobial, antioxidant and flavoring properties are growing. In recent years increasing antimicrobial effects of various vegetable oils with other antimicrobial agents has been of interest to researchers. In this study the antibacterial effects of essential oils of Oregano, Cumin and EDTA alone and in combination with each other on *Salmonella typhimurium* in vitro disc diffusion method and Broth micro dilution MIC testing was evaluated. Initially taken an average diameter (Mean±sd) of bacterial growth in disk diffusion method for oils Oregano, Cumin and EDTA, respectively: (9±1.0), (7.66±0.57) and (14.66±1.52) mm was calculated. Also, MIC and MBC affect has been examined: Oregano (2.5, 5), Cumin (2.5, 5) EDTA (1.25, 2.5) milligram per milliliter, respectively. Comparing the combination of materials has been significantly enhanced antibacterial affects of Oregano essential oil compounds with EDTA, Cumin essential oil and EDTA (p <0.05).



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**BREAKING SEED DORMANCY IN BLACK HENBANE
(*HYOSCYAMUS NIGER*): THE ROLE OF GIBBERLIC ACID AND COLD
STRATIFICATION**

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Black henbane (*Hyoscyamusniger*) a species in solanaceae family has long been used as a medicinal plant. A strong-scented annual or biennial herb, which all its parts especially seeds contain tropane alkaloids. One of the main problems that prevent sustainable use of medicinal plants, native to the arid lands is that they readily germinate within the native environment, but fail to show good germination under laboratory conditions or when cultivation is attempted [1,2]. Black henbane seeds have low germination rate even under normal laboratory conditions. This study were done to determine the effects of exogenous application of gibberlic acid (GA₃) in different concentrations (0, 50,100,150,200 and 250 mg/L) and two duration of cold stratification (30 days and 60 days stored in a refrigerator at 2±4 °C) on breaking dormancy of black henbane seeds of three locations (Karaj, Kermanshah, Kandovan). To do this, before placing the seeds in Petri dishes, they were soaked in different GA₃ solutions. Results revealed that the seed germination of Kandovanregion (altitude; 1900 m) started and stopped at 5 and 16 days after chilling, respectively. While the highest germination percentage was obtained in seeds that were cold stratified for 30 days. The highest rate and percentage of seed germination of Kermanshah (2300 m) and Karaj (1300 m) were obtained in concentration of 200 and 250 mg/l GA₃, respectively. The lowest germination percentage was determined in control untreated seeds. GA₃ in a concentration of 200 mg/l combine with 30 days cold stratification were the most important factors affectingseed for all of three collection area.

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**COMPARISON STUDY OF ANTIBACTERIAL EFFECT OREGANO
AND CUMIN ESSENTIAL OILS AND EDTA ON STAPHYLOCOCCUS
AUREUS BY DISC DIFFUSION METHOD AND BROTH
MICRODILUTION MIC TESTING**

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The use of essential oils of some plants in the food industry due to having antimicrobial, antioxidant and flavoring properties are growing. In recent years increasing antimicrobial effects of various vegetable oils with other antimicrobial agents has been of interest to researchers. In this study the antibacterial effects of essential oils of Oregano, Cumin and EDTA alone and in combination with each other on *Staphylococcus aureus* in vitro disc diffusion method and Broth micro dilution MIC testing was evaluated. Initially taken an average diameter (Mean±sd) of bacterial growth in disk diffusion method for oils Oregano, Cumin and EDTA, respectively: (8.66±1.15), (0) and (18±1.00) mm was calculated. Also, MIC and MBC affect has been examined: Oregano (2.5, 5), Cumin (2.5, 5) EDTA (1.66, 0.83) milligram per milliliter, respectively. Comparing the combination of materials has been significantly enhanced antibacterial activity of Oregano essential oil compounds with EDTA, Cumin essential oil and EDTA (p <0.05).



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**THE STUDY OF ANTIOXIDANT ACTIVITY OF PHENOL
COMPOUNDS IN ARTEMISIA FRAGRANS WILLD. AND
ARTEMISIA VULGARIS L.**

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Artemisia (Asteraceae) is one of the largest and most widely distributed genera of the approximately 60 genera in the Anthemideae tribe. This genus comprises more than 400 species and thirty-four species have been reported in Iran. There is growing interest in natural sources of nutrients and health-promoting compounds. Within these compounds, polyphenols and antioxidants have aroused special attention, which is understandable because of their role as potential protective and preventive molecules against chronic ailments, such as atherosclerosis and cardiovascular diseases, ischemic heart disease, Alzheimer's disease, cancer and in the entire aging process [1-3]. The purpose of this study was to determine total phenolic [4] and flavonoid [5] contents and antioxidant activity in flowers, leaves, shoots and roots of methanolic extracts in 2 species of *Artemisia* (*A. fragrans* and *A. vulgaris*). The *Artemisia* species were collected from Urmia of West Azarbaijan at the flowering stages. The highest and lowest phenolic contents were observed respectively in leaves of *A. fragrans* and stems of *A. vulgaris*. The highest flavonoid contents and inhibitions of lipid peroxidation [6] were determined in flowers of *A. fragrans* and the lowest was in roots of *A. vulgaris*. The highest and lowest scavenging of DPPH capacity [7] was found respectively in flowers and stems of *A. vulgaris*. Regarding to the results of this study, it seems that antioxidant and antiradical activities are not depended solely on the high contents of total phenolics but also on the nature of the compounds.

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**IMPACT OF PLANTING PATTERNS ON WEED DENSITY, AND
GROWTH CHARACTERISTICS OF CARAWAY**

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Caraway (*Bunium persicum* L.) is a flavorful and aromatic herb of Apiaceae. It has small canopy and therefore is sensitive to weed competition. Planting pattern is an agronomic approach that affects population and density of weeds. In order to study the impact of random and row patterns on density of weeds and some growth characteristics of caraway, a field experiment was performed at the Agricultural Research Station, Ferdowsi University of Mashhad during growing season of 2011-2012. Growth characteristics at rosette and flowering stages of caraway (three year) were measured. The results showed that the height, crown diameter and canopy coverage percentage of caraway at rosette stage for row planting, respectively were 15, 20 and 81% higher than the other pattern. At this time, weed density for row planting was 7% less than random pattern. Although, growth characteristics of caraway at flowering stage was same with rosette stage, but weed density at this stage was 17% higher than random pattern [1,2].

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**EFFECT OF DRYING METHODS ON ESSENTIAL OIL CONTENTS
AND CITRONELLAL OF LEMON BALM**

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Medicinal plants are the main sources of natural antioxidants. Lemon balm (*Melissa officinalis* L.) belongs to the Lamiaceae family and its leaves have been used as herbal tea for claiming the nervous system. In order to study the impact of drying methods on drying time and qualitative characteristics of lemon balm, an experiment was conducted based on completely randomized design with six replications at the Special Laboratory, College of Agriculture, Ferdowsi University of Mashhad during 2012. Leaves dried at three temperature with oven (30, 40 and 60°C) and natural methods (shaded and sunny airs). The drying process was continued until the moisture content of leaves reduced about 10% based on dry weight. The effects of different drying methods were significant ($p \leq 0.01$) on essential oil and Citronellal contents of lemon balm. By increasing in oven temperature, drying time for leaves was declined. The maximum Citronellal and essential oil were observed in shaded air (with 0.3 and 53.4%, respectively) and their minimum were in 60°C oven (with 0.02 and 12.5%, respectively).

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A COMPARISON ON EFFECT OF THE THIOBACILUS BIOLOGICAL FERTILIZER AND SUPERABSORBENT ON THE MORPHOLOGICAL TRAITS AND ESSENTIAL OIL YIELD OF *THYMUS VULGARIS* AND *T. DAENENSIS*

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Nowadays there demands of medicinal plants are increasing; therefore human consumption of medicinal plants is increasing rapidly for their food and industrial benefits. Thyme plant is one of the most important of medicinal plants and today's products of this plant have grown in number and importance. Thymol and carvacrol are two main compounds existing in the essential oil of thyme because of their pharmaceutical and industrial applications. So, mass production of medicinal plants considering maintenance and preservation of natural resources is of vital importance. Proper and optimal fertilization using biological fertilizers is among numerous factors involved in this concern.

Sulphur is extremely important element to plant growth and soil health and needs to be oxidized in order to be absorbed by plants. The most important organisms for this concern are a group of bacteria belonging to the genus *Thiobacillus*. In order to study effect of biological fertilizers on Morphological and percentage of essence on two species of medicinal *thyme* plant, an experiment was carried out in the basis of factorial randomized complete block design with 3 replications in Greenhouse, located in Karaj. The tested factors were: two species of medicinal *thyme* plant (*Thymus daenensis* and *Thymus vulgaris*), *Thiobacillus* at two levels (inoculated, non-inoculated) and Superabsorbent with three levels (0, 0.5, 1 gr/kg soil). In this study, some variables such as Number of branches, crown diameter, leaf area and Percentage of essences were measured. The result showed a Superabsorbent treatment for at least 1% of the leaf area And crown diameter, number and percent of peripheral branches Was significant at the 5% level. *Thiobacillus* treatment and Super Absorbent with *Thiobacillus* For all traits Was significant at the 5% level. Superabsorbent treatment the value 1 gr/kg soil 1% for leaf area was significant. treatment and Super Absorbent with *Thiobacillus* The value 1 gr/kg soil Works better than the other levels On all the attributes And species of *Thymus vulgaris* Higher than *thymus daenensis*.

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**INVESTIGATION OF EFFECT OF DIFFERENT DOSES OF
HYDROALCOHOLIC EXTRACT OF *GLYCYRRHIZA GLABRA*'S
RHIZOM ON THE MECHANICAL ACTIVITY OF ISOLATED
TRACHEA OF MALE RAT**

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Glycyrrhiza glabra's rhizome as a medicinal plant has been used in Iran traditionally for reducing spasm. The purpose of this study was to investigation of the effect of hydroalcoholic extract of *Glycyrrhiza glabra*'s rhizom on the mechanical activity of isolated trachea of rat. 15 male rats weighing 210 to 230 g were kept under 12hr/12hr dark/light cycle and temperature of $22 \pm 2^{\circ}$ C for one week. After anesthetization by intraperitoneal injection of sodium pentobarbital, trachea was removed and divided into pieces 3 mm, then rings of isolated trachea one of mouse's divided to control and experimental groups and were inserted to organ bath contained 37° c, PH=7.4 and oxygenated krebs solution and associated with a transducer and bridge amplifier power lab system for recording mechanical activity. After establishing of baseline conditions, mechanical activities of trachea was recorded in experimental group in the presence of hydroalcoholic extract of *Glycyrrhiza glabra*'s rhizom with various concentrations 0.002, 0.007, 0.012, 0.016, 0.021, 0.026, 0.031, 0.036 (mg /ml) and the control group in the presence of solvent extracts (ethanol 70%) in a similar situation.

The results demonstrated that remarkable differences in the mechanical activity of the tissues was observed in the experimental and control group, So that the hydroalcoholic extract of *Glycyrrhiza glabra*'s rhizom at doses of 0.012 to 0.036 mg /ml had relaxant effect and in dose of 0.036 mg/ ml had the maximum relaxant effect on tracheal tissue and its tension in this dose showed a significant decrease then control group. It can be concluded the hydroalcoholic extract of *Glycyrrhiza glabra*'s rhizom which has inhibitory effect on mechanical activity of isolated tracheal and possibly has together relaxation effect.



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**ALOE VERA GEL CONCENTRATION BY REVERSE OSMOSIS
METHOD (REDUCTION ENERGY CONSUMPTION)**

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Aloe vera (Aloe barbadensis Miller) is an ancient plant that used for medicine & cosmetic purpose. Because of many properties of *Aloe vera*, was known as a magic plant [1]. Over time, each day more properties of this plant have been discovered. Aloe leaves contain an external green skin and internal colorless gel layer. Most of the therapeutic properties of *Aloe vera* are related to its gel. *Aloe vera* gel contains about 99% water. Large amount of water provides a good environment for growing bacteria & making unstable the gel [2]. Concentration & drying are two suitable methods to increase its stability. Several methods have been used to concentrate the aloe gel. These methods are: evaporating, osmosis, reverse osmosis (RO) & high hydrostatic pressure concentration [2, 3]. Concentrating *Aloe* gel in industrial scale by reverse osmosis method is recommended because of its high quality of products. Since in industrial scale processes cost saving is an important problem, in this research has tried to investigate influence of various parameter on energy consumption in RO concentration systems. In each experiment, 1 liter of aloe gel has concentrated in RO system. Experiments were done in room temperature (20°C). Require pressure and flows of feed in each trial were changed to produce 4 and 10 X aloe gel products. This experiment was designed by using *Box-Behnken* method and the optimum point was determined.

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**THE EFFECT OF DROUGHT STRESS ON GERMINATION
CHARACTERISTICS AND PRELIMINARY GROWTH OF FLEAWORT
AND PURPLE CONEFLOWER**

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Soil water supply is an important environmental factor controlling seed germination. In order to study the impact of different water potential levels on germination characteristics and preliminary growth on fleawort (*Plantago ovata* L.) and purple coneflower (*Echinacea purpurea* L.), a laboratory experiment was conducted based on completely randomized design with four replications at the Special Crop Laboratory, College of Agriculture, Ferdowsi University of Mashhad during year of 2011. Water potential levels were zero, -3, -5 and -7 bars. Polyethylene Glycol-6000 and deionized water were used for water potential and zero potential, respectively. The results showed that the effect of different drought stress levels was significant ($p \leq 0.01$) on final germination, germination rate (GR), plumule length and radicle length and seed vigor index of fleawort and purple coneflower. Drought stress reduced water absorption and then disordered germination of both species. Increasing water potential from zero to -7 bars decreased GR up to 100%. It concluded that purple coneflower is more sensitive medicinal plant than fleawort to drought stress.

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**PREPARATION OF AN HERBAL EMULGEL FOR TREATMENT OF
HEMORRHOIDS**

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Hemorrhoids are one of the most common gastrointestinal diseases with swollen veins in the anal canal. Emulgels have emerged as one of the useful semisolid drug systems as they have improved the stability of emulsion by incorporating it in a gel matrix. The aim of this study was to achieve a suitable formulation of Jellified emulsion containing Horse chestnut, *Calendula officinalis* and Althaea extracts for treatment of Hemorrhoids. Horse chestnut extract, which was purchased from LEPRO Company, incorporated and standardized based on DAB 10. Calendula and Althaea extracts were obtained by BP methods. Subsequently, in suitable oil in water emulsion base, herbal extracts and gel phase have been added. Physico-chemical tests such as creaming, coalescence, thermal test, pH changing, centrifugal test, viscosity, spread ability, cooling and heating test and content uniformity were determined.

Achieved results of study showed that using of appropriate amount of emulsifier and gel factor had interesting effect on stability of system. Most of formulations had acceptable physicochemical characteristics and stability parameters. Conclusion: The results of studied revealed that emulgels are a perfect choice for preparing tropical cream with herbal extract when unknown effect of herbal elements will be taken place on stability of formula. The best formula was selected for clinical trials.

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**EFFECT OF VARYING LEVEL OF BIOLOGICAL AND CHEMICAL
PHOSPHORS ON SAME MORPHOLOGICAL TRAITS SUMMER
SAVORY (*Satureja hortensis* L.) PLANT**

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To evaluate the effect of chemical and biological phosphorus on Stem length, Stem diameter, Number lateral branches, Canopy height, Leaf area of *Saturejahortensis*, a factorial experiment was conducted based on randomized complete block design with three replications in 2011. Treatments were chemical phosphorus (0, 50, 100 and 150 kg/ha P₂O₅ as triple super phosphate) and biological phosphorus (0, 100, 200 and 300 g/ha of *Pseudomonas Putida* (Strain P13) and *Bacillus lentus* (Strain P5). Results of Analysis of Variance (ANOVA) showed the significant interaction effect between chemical and biological phosphorus on the Stem length, Stem diameter, Number lateral branches, Canopy height, Leaf area. The highest Canopy height (28 cm), Stem diameter (5.3 mm) and Number lateral branches (16) was obtained from 0 kg/ha of chemical phosphorus + 200 g/ha of biological phosphorus and highest Stem length (44 cm) related to treatment 150 kg/ha of chemical phosphorus + 0 g/ha of biological phosphorus and highest Leaf area (70200 mm²) was obtained from 100 kg/ha of chemical phosphorus + 0 g/ha of biological phosphorus. The minimum Stem length (37 cm) and Number of lateral branches (13) related to treatment 50 kg/ha of chemical phosphorus + 200 g/ha of biological phosphorus, Stem diameter (4 mm) and Leaf area (25000 mm²) in 150 kg/ha chemical phosphorus + 100 g/ha of biological phosphorus and minimum Canopy height (20 cm) in 0 kg/ha chemical phosphorus + 100 g/ha of biological phosphorus was obtained [1, 2].

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**STUDY ON THE TECHNICAL EFFICIENCY IN ROSE WATER
INDUSTRY IN CITY OF KASHAN, IRAN**

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Rosewater industry, a supplementary industry in Kashan, is one of the important sources of income and occupation for this province's inhabitants. Due to the limitation of production resources and rich background in rosewater industry in Iran, technical efficiency of its production was studied using economic optimality principles with usage of production inputs from rosewater producers in city of Kashan in 2009. Information and data were collected through questionnaire from 100 rosewater producers in 5 sections. Sampling method is classification with proportional allocation. After estimation of Translog functional form and its selection as optimum form of relationships between production and inputs consumption, technical efficiency by stochastic frontier analysis was obtained. Results of the estimated production function showed that 22% of producers use flower input more than optimum level while 28% of producers use water input in first production area, i.e., with increasing of this input they can increase their production. The average of technical efficiency in sample is 97% which has fluctuated between minimum of 67% and maximum of 99%.



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**THE EFFECTS OF CORN OIL ON COLONIC MUCOSAL THICKNESS
IN RABBIT**

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The use of vegetable oils, particularly corn oil as Reducercholesterol in people with high cholesterol and heart disease increased. Furthermore, a positive relationship between fat intake and colon cancer has been reported. In this study we have investigated the effects of corn oil on rabbit colonic mucosal thickness. In this Experimental study, the rabbits were divided into three experimental groups that Received corn oil orally for one, two and three months respectively and there was a control group for all groups. In the end, the rabbits were killed and their colon with two general methods (H & E) and specific (PAS) staining and the thickness of the colonic mucosa were examined. Thickness of the colonic mucosa in all three parts of the colon in the one-month group than in the control group was reduced. In Two- month group thickness reduction reached its maximum And thickness in three-month group were similar with control groups. Corn oil can cause inflammation of the colon and increasing duration of use Inducement disease entering acute phase to chronic phase. Therefore, long-term consumption of corn oil with chronic inflammation of the colon may cause cancerous changes in the colon mucosa.[1, 2].

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**ESTIMATION OF THE MILK THISTLE OIL PERCENT BY USING
STEPWISE REGRESSION**

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Milk thistle (*Silybum marianum* L. Gaetrn) is annual or biennial plants belong to Asteraceae family and spread in north and south of Iran. Seeds of milk thistle contain a relatively high amount of oil (20-35%), which possesses therapeutic as well as nutritive value due to its high content of unsaturated fatty acids and vitamin E. The purpose of this research is estimation the milk thistle oil percent by using allometric traits and stepwise regression. In this study, pot experiment done in a completely randomized design with two treatments milk thistle genotypes (Ahvaz wild type and Germany) in six replications. Plant height (H), leaf number (LN), leaf dry mass (LDM), specific leaf area (SLA), leaf area (LA) and total dry matter (TDM) measured. Stepwise regression method was used to estimation percentage of milk thistle oil. The results showed that can be estimated seed oil percentage to 84.01 significantly by using the plant height (68.28%) and specific leaf area (15.74%).

$$\% \text{Oil} = 23.12619 + 0.16558 H - 0.00288 \text{ SLA}$$

According to the high positive correlation plant height with oil content (82.63), this trait can be used to breeding the milk thistle in order to increasing oil content. Milk thistle, Genotype, Oil, Stepwise regression



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**THE EFFECTS OF MYCORRHIZA, *THIOBACILLUS* INOCULATUON
AND SULFUR APPLICATION ON SOME PHYSIOLOGICAL
PARMETERS OF GARLIC (*ALLIUM SATIVUM* L.)**

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Garlic (*Allium sativum* L.) is one of the most important medicinal crops. This study was conducted at Sari Agricultural Sciences and Natural Resources University based completely randomized block design with 12 treatments and three replications. The treatments were combination of mycorrhizal fungi inoculation (*Glomus mosseae*), *Thiobacillus* bacteria and sulphur application (0.75 and 150 kg/ha). Treatments include: T₁) control plot, T₂) mycorrhizal fungi, T₃) *Thiobacillus* bacteria, T₄) mycorrhiza + *Thiobacillus*, T₅) 75 kg/ha sulfur, T₆) 75 kg/ha sulphur + mycorrhiza, T₇) 75 kg/ha sulphur + *Thiobacillus* T₈) 75 kg/ha sulfur + mycorrhiza + *Thiobacillus*, T₉) 150 kg/ha sulphur T₁₀) 150 kg/ha sulphur + mycorrhiza, T₁₁) 150 kg/ha sulphur + *Thiobacillus* T₁₂) 150 kg/ha sulphur + mycorrhiza + *Thiobacillus*. The results of this study showed that the effects of above treatments were significant in terms of chlorophyll a, chlorophyll b, carotenoid and essential oil yield. In all of mentioned characteristics the highest values were obtained from combination of 150 kg/ha sulphur with dual inoculation of mycorrhiza and *Thiobacillus* (T₁₂) and the lowest value was obtained from control plots. The chlorophyll a at T₁₂ was 0.87 mg/g as compared to 0.61 and 0.62 for T₁ and T₃ respectively. Also the highest value of chlorophyll b derived from T₁₂, T₁₁ and T₁₀ (2.28, 2.24, 2.22 mg/g) and the lowest obtained from T₁, T₂ and T₃ (1.45, 1.75 and 1.768 mg/g). Results of this study showed that the highest carotenoid obtained from T₁₂ (2.439 mg/g) and the lowest value was related to control plots (1.807 mg/g). The essential oil yield at T₁₂ was 149.7 mg/g as compared to 36.82, 48.42 and 61.96 for T₁, T₂ and T₃ respectively. Results of this study also T₁₂ indicated that the highest chlorophyll a, chlorophyll b, carotenoid and essential oil yield was recorded in T₁₂ (2.28, 0.87, 2.43 and 149.7) and the lowest value was related to control plots (1.46, 0.62, 1.81 and 36.82). In other word application of 150 kg/ha sulphur plus mycorrhiza and *Thiobacillus* caused the highest treatment increased about 56, 42, 36% and nearly four times as compared to control, respectively. The chlorophyll a, chlorophyll b, carotenoid and essential oil yield significantly increased due to the application of 150 mg/kg sulphur with mycorrhiza and *Thiobacillus* treated plots as compared with control.

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**THE STUDY OF SOME MEDICINAL-CHEMICAL CHARACTERISTICS
IN FOUR OLIVE CULTIVARS**

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Demand for olive products has increased dramatically in recent times due to higher incomes and interest in a healthy lifestyle. Olive oil is mono-unsaturated fatty acids and contains antioxidants that reduce heart diseases [1, 2]. The purpose of this research was to study the total phenol, flavonoid, chlorophyll and carotenoid content in different cultivars of olive (*Olea europaea*). The samples were collected from Olive Research Station of Gorgan and the experiment was conducted in the laboratory of Gorgan faculty of plant production. The study was in a completely randomized design with four cultivars including `Zard`, Blaidi, `Arbekin` and `Lechino` and three replications. Results of analysis showed that the different cultivars had significant effects on total phenols and flavonoid content in fruits, as well as chlorophyll and carotenoid content in olive oil. Total phenols and Flavonoid content, was higher in `lechino` cultivar (0.699 and 0.389 mg per kilogram, respectively), while the total phenols content was lower in `Blaidi` cultivar. `Arbekin` cultivar had the lowest flavonoid content (0.251mg per kg). The greatest content of chlorophyll (1.16 mg per kg) and carotenoid (0.718 mg per kg) were related to `lechino` cultivar. The minimum amount of chlorophyll was in `Blaidi` cultivar (0.041 mg per kg). Carotenoid content was the lowest in `Arbekin` cultivar (0.233 mg per kg).

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**ALLELOPATHIC EFFECTS OF CITRULLUS
(*CITRULLUS COLOCYNTHIS*L.) EXTRACT ON SEED GERMINATION
AND SEEDLING GROWTH OF OCIMUM (*OCIMUM BASILICUM*L.)**

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The study of allelopathic properties of plants is one of up-to-date biological and ecological methods, which can lead to discover the bio-herbicides and growth inhibitors. In order to study the allelopathic effects of Citrullus (*Citrullus colocynthis* L.) on seed germination and seedling growth on Ocimum (*Ocimum basilicum* L.), these experiments were conducted. The extracts of Citrullus different organs including fruit, stem and root were applied at five concentration levels (0 as control, 0.25, 0.5, 0.75 and 1%) through a factorial experiment based on a completely randomized design with three replications.

The results showed that different organ extracts had different negative effects on seed germination and seedling growth of the species in such a way that fruit extracts had the highest inhibitory effect. With increasing extract concentrations of Citrullus, the seed germination and seedling growth of the species was reduced significantly. The minimum amount of seed germination and growth of the seedlings were observed at 1% extracts concentration of fruit. Also, Ocimum seedlings appeared to be more sensitive to Citrullus extracts seedlings. The extracts of Citrullus different organs had inhibitory effects on seed germination and seedlings growth of ocimum. Also, the highest inhibitory effects were related to fruit extracts.

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THE EFFECT OF POLYAMINES (PUTRESCIN, SPERMIDIN AND SPERMIN) ON GROWTH, YIELD AND ESSENTIAL OIL OF MOLDAVIAN *DRACOCEPHALUM* L.

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Dracocephalum moldavica L. is an annual plant belong to Lamiaceae family. Native in Central Asia and naturalized in Eastern and Central Europe with local and global importance. The essential oil of moldavian has natural antibacterial and antimicrobial substances and having wide usage like medicinal, cosmetic and food industries. The volatile oil content of moldavian and its composition showed great variation due to plant origin, climate conditions, and soil fertility and growth regulators. Polyamines are group of growth regulators with different hydrocarbon group and low molecular weight cations present in all living organisms. Polyamines and their biosynthetic enzymes have been implicated in a wide range of metabolic processes in plants, ranging from cell division and organogenesis to protection against stress. Due to study the effects of Polyamines on moldavian a factorial experimental design was applied in a randomized complete blocks with putrescin, spermidin and spermin (0, 0.1, 0.2, 0.4 mL) in 20012. Results showed that Polyamines has significant effect on growth and development of moldavian. The highest plant and the largest number of branches per plant were obtained at the third level of the spermin treatment and the highest essential oil content obtained at the third level of the spermidin. Therefore, polyamines have positive effect on growth, yield and essential oil and using of the as a suitable approach to increasing the amount of essential oil is recommended.



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EFFECT OF DIFFERENT DENSITY LEVELS ON MARIGOLD YIELD

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Marigold (*Calendula officinalis* L.) fit into the oldest medicinal plants which had been used for the pharmaceutical industries from the ancient times. In order to evaluate the impacts of different plant densities on growth and flower and seed yield of marigold, a field experiment was performed based on randomized complete block design with four replications at the Agricultural Research Station, Azad University of Torbat-e-Jam, during growing season of 2008-2009. Four plant densities included 20, 30, 40 and 60 plants. m⁻². Flowers were harvested at three stages. Seeds were collected at the end of growing season. Harvest index (HI) calculated based on the ratio between flower yield and biomass yield of marigold. The results indicated that the effect of plant density was significant ($p \leq 0.01$) on seed yield, flower yield, biological yield and HI of marigold. By increasing plant density from 20 to 60 plants. m⁻², biomass yield enhanced up to 100%. Whereas, by increasing plant density up to 40 plant.m⁻², seed yield and flower yield declined afterwards [1, 2].

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**ALLELOPATHIC EFFECTS OF CITRULLUS
(CITRULLUS COLOCYNTHISL.) EXTRACT ON SEED GERMINATION
AND SEEDLING GROWTH OF
PURSLANE (PORTULACA OLERACEA L.)**

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The study of allelopathic properties of plants is one of up-to-date biological and ecological methods, which can lead to discover the bio-herbicides and growth inhibitors. In order to study the allelopathic effects of Citrullus (*Citrullus colocynthis* L.) on seed germination and seedling growth on Purslane (*Portulaca oleracea* L.), these experiments were conducted. The extracts of Citrullus different organs including fruit, stem and root were applied at five concentration levels (0 as control, 0.25, 0.5, 0.75 and 1%) through a factorial experiment based on a completely randomized design with three replications. The results showed that different organ extracts had different negative effects on seed germination and seedling growth of the species in such a way that fruit extracts had the highest inhibitory effect. With increasing extract concentrations of Citrullus, the seed germination and seedling growth of the species was reduced significantly. The minimum amount of seed germination and growth of the seedlings were observed at 1% extracts concentration of fruit. Also, Purslane seedlings appeared to be more sensitive to Citrullus extracts seedlings. The extracts of Citrullus different organs had inhibitory effects on seed germination and seedlings growth of Purslane. Also, the highest inhibitory effects were related to fruit extracts.

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STEROLS FROM *NIZAMUDIINIA ZANARDINII*, A BROWN ALGA OF OMAN SEA

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Marine algae are the important source of novel bioactive substances, of which brown algae (Phaeophyceae) have been the object of various phytochemical and biological studies, resulted in the discovery of more than 500 new metabolites. *Nizamuddinia zanardinii* is one of the brown algae distributed in Oman Sea (Chabahar and Tang in Iran) and there has been no literature on its chemical composition. In the present study, ethalonic extract of *N. zanardinii*, obtained by percolation, has been subjected to different chromatographic separation methods. Purification of the compounds has been carried out on silica gel and sephadex LH20 column chromatography. The isolated compounds were identified as fucosterol (1), 24-hydroperoxy-24-vinylcholesterol (2), 24-hydroxy-24-vinylcholesterol (3) and 4-hydroxy benzoic acid (4). The structural elucidation of the compounds has been performed on the basis of the spectral data obtained from ¹H-NMR, ¹³C-NMR, EI-MS in comparison with those previously reported in the literature.

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**ANALYZING OF 4 MEDICINAL PLANTS ESSENTIAL OIL'S
POTENTIAL ALLELOPATHIC ACTIVITY ON PIGWEED SEEDS
(*AMARANTHUS RETROFLEXUS L*) GERMINATION AND GROWTH**

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Medicinal and Aromatic plants form a numerically large group of economically important plants which provide basic raw materials for medicines, perfumes, flavors and cosmetics. These plants and their products help the country to earn valuable foreign exchange by way of export. Worldwide a new tendency toward consuming medicinal plants is emerging. Nowadays all developed countries aim to produce chemical free and natural products. Herbicides and agrochemicals based on natural products are attraction for a variety of reason (eco-friendly, cost effective and biodegradable) and identification of new allelochemicals in higher plants has been attempted.

In order to distinguish Allelopathic effect of 4 medicinal plants essential oil on pigweed seeds germination, an experiment by using *Chamaemelum nobile*, *Satureja hortensis L.*, *Thymus vulgaris L.* and *Rosmarinus officinalis* essential oil was done, based on a completely randomized design with four replications. Treatments were done with 5 difference essential oils concentrations (0 as blank, 150, 300, 600 and 900 micro liter/liter). Results reveal that the lowest germination percentage (0 as blank, 150, 300, 600 and 900 micro liter/liter) and the shortest radicle length were caused by thyme essential oil application. The minimum plumule length (0 as blank, 150, 300, 600 and 900 micro liter/liter) was achieved by Savory essential oil application. Among treatments, concentrations of thymus essential oil that were higher than 300 mL/L and also Savory's essential oil, effectively inhibited seed germination of pigweed. The mentioned treatments impacts were considerable, their efficiency were up to 100%. Rosemary's essential oil application showed the same result but only when the highest concentration (900 micro liter/liter) was used. In conclusion, it can be said that there is a negative correlation between germination percentage and essential oil concentrations. By increasing the concentration, the impact on weed seed's germination becomes more significant. By increasing the concentrations not only the length of plumule and radicle decreased but also dry and wet weight dropped. As a final conclusion, these aromatic medicinal plants, Savory and thyme, have potential allelopathic activity and they are good candidates for finding new allelochemicals for using in agriculture for weeds control as bio-herbicides.



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FLAVONOL GLYCOSIDES FROM *PALIURUS SPINA-CHRISTI*.

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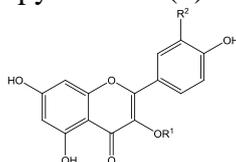
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Paliurus spina-christi Miller (Rhamnaceae), known as christ's thorn, is a perennial thorny shrub that widespread distribution in dry and rocky places in the Mediterranean region and Asia. This plant is a traditional mediterranean and Asiatic medicinal plant, commonly used as diuretic and against diarrhea and rheumatism. *Paliurus spina-christi* collected from Marzanabad in the north of IRAN. The air-dried parts cut into small pieces and extracted with methanol. The extracts subjected to column chromatography on Silica gel and Sephadex LH-20. Four pure flavonol glycoside, Quercetin 3-O-β-D-glucopyranoside (**1**), Quercetin 3-O-β-D-galactopyranoside (**2**), Apigenin 3-O-β-D-glucopyranoside (**3**) and Quercetin 3-O-α-L-rhamnopyranosyl-(1→6)-β-D-glucopyranoside (**4**) identified by NMR spectroscopy.



1: R¹ = Glc, R² = OH

2: R¹ = Gal, R² = OH

3: R¹ = Glc, R² = H

4: R¹ = Rha-Glc, R² = OH

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**PHYSIOLOGICAL RESPONSES OF ANISE HYSOP
(*AGASTACHE FOENICULUM* L.) TO DROUGHT STRESS**

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Drought stress is one of the most important ecological factors that limiting the productivity of crop plants in the world. Anise hyssop (*Agastache foeniculum* L.) is a medicinal and perennial herb plant belonging to the Lamiaceae family. Anise hyssop's essential oil used in pharmaceutical and food industries. This study was conducted to evaluate the effects of drought stress on some physiological parameters of anise hyssop. Drought stress was imposed by withholding irrigation for 15 days and physiological parameters (proline content, total soluble solids (TSS), relative water content (RWC) and leaf temperature) were measured in 3 days intervals. The results revealed that proline and TSS accumulation and leaf temperature were increased as the soil water content decreased. Leaf proline content in the third and fifteenth days was 2.65 and 13.35 $\mu\text{mol/gr}$ fw, respectively. In contrast RWC was decreased as the soil water content decreased. RWC in the third and fifteenth days were 87.2 and 64.6%, respectively. The results of this study showed that anise hyssop uses osmoregulation mechanism to tolerate the water deficit conditions by increasing proline and TSS accumulation.

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**POTENTIAL ALLELOPATHICACTIVITY OF 4 MEDICINAL PLANTS
ESSENTIAL OIL ON LAMB'S-QUARTERS WEED SEEDS
(*CHENOPODIUM ALBUM*) GERMINATION AND GROWTH**

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Medicinal plants may have been considered as valuable endemic heritages but their importance is widely accepted around the world. Hans Molisch used "allelopathy" for the first time in 1937. According to its definition, each produced process by plants, microorganisms, viruses, algae and fungi which finally ends to secondary metabolites and organic compounds productions (allelochemicals) and consequently have effects on agriculture biology systems could be called allelopathy. Widespread use of synthetic herbicides has resulted in herbicide-resistant weeds, and public concerns over the impact synthetic herbicides have on human health and the environments are increasing. These concerns are shifting attention to alternative weed control technologies based on natural products. Hence, in this present work, allelopathic effects of 4 medicinal plant essential oil including *Chamaemelum nobile*, *Satureja hortensis L.*, *Thymus vulgaris L.* and *Rosmarinus officinalis* were studied on lamb's-quarters seeds. The experiment was conducted in a completely randomized design with four replications. Investigated treatments were done with different essential oils concentrations (0 as blank, 150, 300, 600 and 900 micro liter/liter). Results reveal that the lowest germination percentage (0 as blank, 150, 300, 600 and 900 micro liter/liter) and the shortest radicle length were caused by thyme essential oil application. The minimum plumule length (0 as blank, 150, 300, 600 and 900 micro liter/liter) was achieved by Savory essential oil application. In this study, thyme and Savory extracts show relatively strong allelopathic activity. In general, germination reduced as essential oil concentration increased. The increased concentrations have an inhibition impact on weeds growth. Length of plumule and radicle, dry and wet weight show decreasing while concentrations increased.

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**HUMIC ACID COUNTERACTS THE ECOTOXICOLOGICAL EFFECTS
OF ARSENIC ON SEED GERMINATION AND SEEDLING GROWTH
PARAMETERS OF SAVORY**

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Human activities all over the earth have increased environmental pollution by heavy metals in agricultural soil [1]. Seed germination is a complex physiological process in plants that represents a limiting stage of plant life cycle under heavy metal stress situation and can be affected severely by heavy metals [2]. The interference of arsenic (As) stress on germination and early seedling growth by humic acid has not been well documented. A laboratory experiment was carried out to examine the effect of humic acid in protecting plant seedlings against arsenic toxicity. Seeds of this plant were exposed to five different concentrations of As and three concentrations of humic acid. The concentration of As and humic acid were 0, 0.5, 1.0, 2.0, 4.0 and 8.0 mg l⁻¹ and 1.0, 2.0 and 4.0 ml l⁻¹, which were prepared by dissolving arsenic oxide III and humic acid (18% v/v) with deionized water, respectively. Ecotoxicological indices based on inhibition rate (IC) of seed germination, mean germination time, root and shoot elongation, biomass (fresh weight and dry weight), as well as IC₅₀ (Cd concentration when 50% plants show inhibition) and tolerance indices (the ratio of maximum root length in an experimental group to that in a control group) were determined. The results indicated that As had little effects (p > 0.05) on seed germination. Different As concentration in most cases decreased dry weight of savory seedling, while the IC of seed germination, mean germination time, root and shoot elongation, fresh weight, IC₅₀ and tolerance indexes was simulated by As extracts at lower concentrations. However, this advantage was not found in higher concentrations, at which the extracts mostly had a negative effect on seed germination and the endpoints of savory seedlings. Root and shoot elongation and fresh weight of seedling are promoted due to exposure of seedlings to different concentration of humic acid; vice versa, dry weight, seed germination and mean germination time decreased significantly (P > 0.05) with increasing concentrations of humic acid and germination percentage appeared to be the most sensitive parameter. The promoting effect of humic acid on seed germination parameters persisted even in the presence of As. The stimulation was most pronounced at higher concentrations of As. Treatment of savory seedling with 1 ml l⁻¹ of humic acid resulted in efficient reduction of the detrimental effect of the abiotic stressors on root growth and morphology.

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EFFECT OF DIFFERENT PLANTING BEDS ON YIELD AND YIELD COMPONENTS OF GARLIC (*ALLIUM SATIVUM* L.)

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Garlic (*Allium sativum* L.) is an important medicinal herb that is readily available everywhere. It contains a substance called Allicin, which has anti-bacterial properties that are equivalent to weak penicillin. In order to investigate the effects of various planting beds on yield and yield components of garlic, a field experiment was conducted based on randomized complete block design with four replication at the Agricultural Research Station, Azad university of Torbat Jam, during growing season of 2009-2010. Treatments including 20 and 40 t.ha⁻¹ manure, 20 and 30 t.ha⁻¹ sand and 5 and 10 t.ha⁻¹ straw and control. The results indicated that the planting bed had significant effects ($p \leq 0.05$) on the leaf dry weight, bulb number, economical yield and biological yield of garlic. The highest garlic biological and economical yield was observed in 40 kg manure with 1085.4 and 723.5 g.m⁻², respectively. There was a positive correlation between leaf weight and bulb number with economical yield of garlic. So, it concluded that agronomic operations enhanced growth characteristics and bulb number of garlic.

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EFFECT OF TEMPERATURE AND ROSEMARY (*ROSMARINUS OFFICINALIS* L.) ESSENTIAL OILS ON GERMINATION OF CORM, WEIGHT LOSS AND STORAGE LIFE OF ONION (*ALLIUM CEPA* L.)

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Today, the use of herbs instead of chemicals in terms of health and environmental protection increase. Indiscussing the use of essential oils and herbs instead of the application of modern agricultural chemicals gamma radiation on onion storage is considered. To investigate the effect of thermal treatment and storage life of onion weight loss factorial experiment in a completely randomized design with 3 replications. Factors include temperature: (4°C, 25°C, 30°C) on different dates (30 and 90 days after harvest) and Rosemary (*Rosmarinus officinalis* L.) essential oils were studied during storage. results of data analysis showed that the thermal treatments were: Germination bulbs, corm growth rate, weight loss, percentage of bulb rot in storage, no significant differences in There is a probability level and the temperature increased to 30°C bulb germination increased and then decreased to a minimum 4°C and Rosemary essential oils to 25°C and 30°C. The difference between the numbers of evaluated traits was significant. High temperatures inhibit germination and growth corm was significantly different.

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EFFECT OF TEMPERATURE AND ROSEMARY (*ROSMARINUS OFFICINALIS* L.) ESSENTIAL OILS IN POTATO SPROUT INHIBITION AND TUBER QUALITY AFTER POST HARVEST

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Today, the use of herbs instead of chemicals in terms of health and environmental protection increase. In discussing the use of essential oils and herbs instead of the application of modern agricultural chemicals gamma radiation potatoes in storage is considered. Storage of potatoes is very important because fresh potatoes are available only for a few months in a year. Thus, any treatment such as temperature that controls sprout growth and extends shelf life of potatoes could be beneficial. In this study, potato sprout inhibition and tuber quality after treatment with various levels of temperature (4°C, 25°C, 30°C) on different dates (30 and 90 days after harvest) and Rosemary (*Rosmarinus officinalis* L.) essential oils were studied during storage. A factorial experiment based on a randomized split plot design with three replications was carried out. This study indicated that significantly decreased sprouting, percent weight loss of tubers and results show application of Rosemary essential oils could be beneficial for potato sprout inhibition and tuber quality after treatment.

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**THE EFFECT OF CADMIUM ON PHENOL AND FLAVONOID
CONTENTS IN BASIL (*OCIMUM BASILICUM* L.)**

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Cadmium toxicity is a serious problem in agriculture. Cadmium accumulation in soils may come from different sources, including air pollutants and soil applications of commercial fertilizers, sewage sludge, manure and lime. The cadmium exposure causes oxidative stress. Phenol and flavonoid are involved in this stress. The effect of different concentrations of cadmium chloride (0, 25, 50 and 75 μM) on the phenol and flavonoid contents in Ardestan and Isfahan cultivars of basil were studied. The samples were harvested after 18 days treatment. With increasing concentration of cadmium chloride, the content of phenol and flavonoid increased in both of cultivars. This increasing in Ardestan cultivar was more than Isfahan cultivar. According to the results, it appears that Ardestan and Isfahan cultivars are resistant to cadmium stress but Ardestan cultivar is more resistant than Isfahan cultivar.



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**YIELD AND YIELD COMPONENTS OF DIFFERENT SPECIES OF
*LALLEMANTIA. SP***

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Dragon head originates in the Caucasian region and is cultivated for ornament and may be locally naturalized in east and east central Europe. An annual or perennial herb, or dwarf shrub [2]. Dragon head is cultivated for its seeds from which oil is extracted the seed contains up to 30% of drying oil The oil may also be used for oil foods and as a tanning agent *Lallemantia sp* seed has traditional uses as reconstitute ,stimulant , diuretic and expectorant.

To evaluate and compare the yield and yield components of two species *Lallemantia iberica* and *Lallemantia royleana* an experiment was conducted in a randomized complete block design with three replications at Research Farm of Shahed University in 2012. Treatments were planted in plots of size 3*1.5 square meters. The planting pattern was 25*5 cm [1]. During the experiment, maintenance procedures such as weeding, thinning, fertilizing etc were applied based on crop needs. After maturity crops were harvested in July. Consequently some traits such as seed weight, number of seeds per plant, seed yield, dry matter and harvest index were measured. The results showed there is significant difference at 5% between two species of *Lallemantia* such as seed weight and number of seeds per plant. While no significant differences were observed between the two species regarding the dry matter and harvest index. The highest seed weight and seed number per plant was for *Lallemantia iberica* species.

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**EFFECT OF TEMPERATURE AND ROSEMARY
(*ROSMARINUS OFFICINALIS* L.) ESSENTIAL OILS IN POTATO
SPROUT INHIBITION AND TUBER QUALITY AFTER POST
HARVEST**

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Today, the use of herbs instead of chemicals in terms of health and environmental protection increase. In discussing the use of essential oil and herbs instead of the application of modern agricultural chemicals gamma radiation potatoes in storage is considered. Storage of potatoes is very important because fresh potatoes are available only for a few months in a year. Thus, any treatment such as temperature that controls sprout growth and extends shelf life of potatoes could be beneficial. In this study, potato sprout inhibition and tuber quality after treatment with various levels of temperature (4°C, 25°C, 30°C) on different dates (30 and 90 days after harvest) and Rosemary (*Rosmarinus officinalis* L.) essential oils were studied during storage. A factorial experiment based on a randomized split plot design with three replications was carried out. This study indicated that significantly decreased sprouting, percent weight loss of tubers and results show application of Rosemary essential oils could be beneficial for potato sprout inhibition and tuber quality after treatment.

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**COMPARISON OF ANTI-INFLAMMATORY AND ANALGESIC
ACTIVITY OF THE *ARTEMISIA ABSINTHIUM* AND ITS MAIN
COMPONENT**

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The herbal medicine had been used since long time extensively in foods and Iranian traditional medicine to treat several disorders with very low side effects. All of the presented synthetic drugs that used for anti-inflammatory and analgesic have side effects. In this study *Artemisia absinthium* had been selected and then its Anti-inflammatory and Analgesic extract and essential oil were evaluated in experimental animals. *A. absinthium* fresh leaves were collected from northern regions of Semnan, and its hydro-alcoholic extract and essential oil extracted by soxhlet and cleverger apparatus respectively. Analgesic activity was evaluated using the acetic acid-induced writhing, formalin, and hot plate tests in mice. The anti-inflammatory activity was evaluated on carrageenan-induced oedema in rats. The chemical composition of essential oil have determined by GC/MS system. The essential oil was given in the doses of 20, 40 and 80 µg/kg and the extract was given in the doses of 50, 100 and 200 mg/kg. The Nerolidol supply from Sigma Company and used as first main component in the dose of 25, 50 and 100 µg/kg. The control group in the analgesic tests was administered morphine as standard drug at 4 mg/kg dose and in carrageenan test received aspirin at 300 mg/kg dose. All the essential oil, extract and aspirin doses administered orally and morphine dose administered injection.

The results showed that the *A. absinthium* and Nerolidol had significant analgesic and anti-inflammatory activity. The dose 100 mg/kg of extract, 40 µg/kg of essential oil and 50 µg/kg of Nerolidol in the study produced significant activity in writhing and hot plate tests; the effect produced by the dose was efficient to reduce acute pain. In addition, essential oil (80 µg/kg), extract (100 mg/kg) and nerolidol (50 µg/kg) significantly ($P < 0.05$) attenuated the formalin induced pain response in rats. Oral administration of the *A. absinthium* leaves extract (50 mg/kg), essential oil (80 µg/kg) and Nerolidol (25 µg/kg) significantly ($P < 0.05$) suppressed the paw edema induced by carrageenan in rats. In acute toxicity study, no mortality was observed at 400mg/kg (extract) and 800 µg/kg (essence) dose level. Seven different components determined to GC / MS test that respective listed according of importance: Nerolidol (56.23%), Santolina triene (17.85%), Alpha-Pinene (7.87%).

The present study confirmed the significant potential anti-inflammatory and analgesic effect of the *A. absinthium* and Nerolidol. We suggested that the analgesic and anti-inflammatory activity of *A. absinthium* is dependent on Nerolidol which present in plant extracts as first main constituent.



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IMPROVEMENT OF ANTIOXIDANT PRODUCTION IN *ROSMARINUS OFFICINALIS* BY TISSUE CULTURE

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The herb rosemary (*Rosmarinus officinalis L.*) is related to the lamiaceae family of plants [1]. The rosemary is an enormous source of natural antioxidants [2]; the potent antioxidant properties of rosemary are mainly due to its phenolic compounds [3]. In this study; in order to improve antioxidant production in rosemary; stem explants of young shoots were cultured in both woody plant medium (WPM) and Murashige and Skoog media (MS) supplemented with 8 g/L agar, 30 g/L sucrose and (0.5 – 3 mg/L) naphthalenacetic acid (NAA) and (0.5 – 3 mg/L) kinetin (Kn) for callus initiation [4,5]. Induced calli were subcultured 2 times with an interval of 21 days. MS medium supplemented with (2 mg/L NAA, 1.5 mg/L Kn) proved to be the best medium for production of callus [6]. Calli cultivated in WPM supplemented with (1.5 mg/L NAA, 3 mg/L Kn) yielded the highest amount of Rosmarinic acid in spectrophotometric assay (0.035 mg RA g⁻¹ FW) [7]. Moreover, antioxidant activity of calli extracts was determined using a number of in vitro assays; including total phenol content and DPPH radical scavenging activity (RSA) [8,9]. On the basis of current findings; we conclude that WPM supplemented with (1.5 mg/L NAA and 3 mg/L Kn) yields higher phenolic content as well as higher antioxidant activity [7,10].

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TWO NEW DAMMARANE TYPE TERPENOIDS FROM
GEUM HETEROCARPUM.

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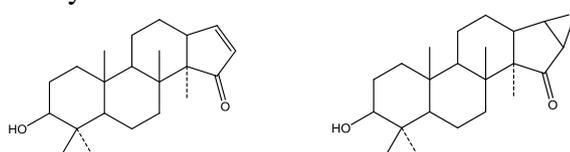
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The genus *Geum* (Rosaceae) contains about 70 species widespread in temperate regions. Some species of this perennial herbaceous plant have been used in traditional medicines especially for astringent effect. *G. heterocarpum* is one of *Geum* species that grows wildly in Iran. Isolation and structural elucidation of the main terpenes of the roots of *G. heterocarpum* from methanolic extract were studied. Two new triterpene, 3-hydroxy-4 α , 4 β , 8 β , 10 β , 14 α -pentamethyl-5 α -gon-16-en-15-one (**5**, Rouinon A) and 3-hydroxy-4 α , 4 β , 8 β , 10 β , 14 α -pentamethyl-5 α -gon-16, 17-epoxy-15-one (**6**, Rouinon B) were identified. The structures of these compounds were determined by extensive spectroscopic analyses, mainly 1D and 2D NMR and MS data.





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ABSORPTION SPECTRA OF CHLOROPHYLL A AND B AND FRESH WEIGHT OF LEAVES IN DIFFERENT ECOTYPES OF LALLEMANTIA.SP AS AFFECTED BY DEFICIT IRRIGATION

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The amount of chlorophyll in living plants is an important factor for photosynthesis. Depending on the duration and stage of growth, the impacts of drought on chlorophyll levels in plants are different [1]. Research aimed to evaluate the phytochemical characteristics and fresh leaves weight changes in the absorption spectra as a function of different irrigation systems in different ecotypes *Lallemantia*. Experiment was conducted in the field of medicinal plants as split plot design with three replications at Shahed University, in spring 2012. Irrigation treatments as main factors at three levels, 10, 50 and 90% of soil water depletion and *Lallemantia* ecotypes as subsidiary factors were applied at four levels 1- *L. iberica* (Urmia), 2- *L. iberica* (Mashhad), 3- *L. royleana* (Isfahan1), 4- *L. royleana* (Isfahan2). To estimate the concentration of a and b chlorophyll 645 and 663nm wavelengths were used. The results showed there is significant difference between the different irrigation treatments and ecotypes of *Lallemantia* in terms of concentrations of chlorophyll a and b, and fresh weight of leaves. The highest concentrations of Chlorophyll related to 90% depletion of available water of the soil. Chlorophyll a absorption with increasing stress intensity followed an increasing trend. Under moderate level of deficit irrigation, *Lallemantia iberica* ecotypes and under higher level of deficit irrigation *Lallemantia royleana* ecotypes showed maximum chlorophyll a absorption. For absorption of (b) chlorophyll in response to different irrigation levels, ecotypes No. 2 and 4 follow an increasing trend but did not follow any specific trend in the other ecotypes. With the increment of deficit irrigation intensity, leaf fresh weight was reduced in both ecotypes of *L. iberica* but there was different response in the *royleana* ecotypes, so by increasing intensity of deficit irrigation significant there were no changes in ecotype No. 3 but a significant increase was observed in ecotype No 4.

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**MORPHOLOGICAL INVESTIGATION OF HAIRY ROOTS INDUCED
IN HYOSCYAMUS NIGER**

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Although some plants' derived substances can be chemically synthesized, most of the valuable plants' secondary metabolites with pharmaceutical effects are still extracted from the plants. For instance, tropane alkaloids, one of the most important groups of secondary metabolites, are obtained from plants extracts. Hyoscyamine, scopolamine and cocaine are examples of tropane alkaloids with medicinal effects, obtained from certain species of solanaceae family. Tropane alkaloids have diverse applications in medicine. For example, these agents can be used for calming the symptoms of Parkinson's disease, treatment of Alzheimer and senile dementia and ataxia's disease. In addition, they are antispasmodic and anti stomach's acid. Nowadays, the different biotechnological methods are applied to produce these alkaloids. Establishment of hairy roots system, induced by *Agrobacterium rhizogenes*, is a method to increase the production of tropane alkaloids. Hairy roots with genetic stability and high-speed growth rate could constantly produce the valuable secondary metabolites. In this study, the morphological characteristics of hairy roots induced in *Hyoscyamus niger* were investigated. The seeds of *H. niger* were cultured in solid Murashig and Skoog medium (pH 5.8) and after germination and production of seedlings, roots were cut and 5-7 mm explants were made. Explants were infected by two strains of *A. rhizogenes*, AR9534 or AR9402. The root explants placed back on solid 1/2 MS medium culture plate for co-cultivation with agrobacterium. After 24h, in order to elimination of bacteria, these explants transferred into MS medium supplemented with cefotaxime. Afterward, these roots transformed to callus phase and produced green, white and yellow calluses. The hairy roots were appeared 15 days after infection and then they were allowed to grow about 4cm and then cultured as induced hairy root lines. In conclusion, 44.4% of the explants infected with AR9534, produced different types of calluses without hairy roots and 55.5% of the explants developed calluses with hairy roots. For the explants infected with AR9402, 28.5% of the explants generated diverse types of calluses without hairy roots and 71.4% produced calluses with hairy roots. In the next step, establishment of the hairy roots would be further investigated by PCR techniques.



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**GERMINATION OF BALANGU (*LALLEMANTIA ROYLEANA*) AS
AFFECTED BY HYDROPRIMING AND GERMINATION
TEMPERATURES**

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Unsuitable germination temperature could be one of the major problems to achieve success in medicinal plants cultivation. Hydro-priming as one of the priming techniques has shown beneficial effects on seedling growth rate, crop yield and reduction of thermal time requirement for germination (Casenava and Toselli, 2007; Ghassemi-Golezani et al, 2010). It is necessary to find the best temperature of germination and priming to achieve medicinal plants potential. Regarding lack of information about suitable temperature for germination and priming of Balangu as one of the anti reflex medicinal plants this study was conducted with combinations of hydropriming and germination temperature in seed laboratory of Shahed University. Seeds of *Lallemantia royleana* were subjected to hydropriming with distilled water for 24 h at 4°C and 24°C. Two temperatures of 10 and 22 were used for germination. Germination at 10 and 22 without hydropriming were used as control. Germination test was performed according to methods of the International Seed Testing Association (ISTA, 1999). Seeds were considered germinated when radicles emerged at least 2 mm. Seedling quality was evaluated after 14 days in respect to the number of normal seedlings. Parameters related to germination, such as maximum germination (G_{max}) and mean germination time (MGT), Germination rate, root length, shoot length, root dry weight and shoot dry weight were measured. Data were analyzed using MSTATC program. Probability of significant differences among treatments and interactions by Duncan test ($p < 0.05$) were used to compare means within and among treatments. Results showed that hydropriming increased germination rate at both temperatures. Germination was faster at 22°C than 10°C. Germination was higher in 10 °C rather than 22°C. hydropriming at 24°C followed by germination at 10 °C showed the most germination (100%) in compared to priming at 24°C and germination at 22°C (24% germination). Generally high temperature of hydropriming (24°C) and low temperature of germination (10 °C) was the best combination for Balangu germination.

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**YIELD POTENTIAL ASSESSMENT OF CUMIN ECOTYPES UNDER
IRRIGATED AND WATER-STRESSED CONDITIONS**

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Cumin (*Cuminum cyminum L.*), belongs to Apiaceae family as a medicinal plant is very important in many countries. Limited water supply is an important factor affecting growth and metabolic activities of plant species. The objective of this study was to evaluate drought tolerance of three ecotypes under water deficit conditions. Three ecotypes differing in yield Performances [1] were studied in field experiments under different levels of irrigation (no stress, cut-off irrigation at first appearance of umbel, appearance of 50% umbels and appearance of 100% umbels). The interaction between ecotype× drought was significant for all traits except harvest index and number of branches whilst there was no significant difference for ecotype and drought effects. Although the effect of drought was not significant due to the tolerance nature of cumin, but since there was a significance ecotype× drought interaction, water deficit conditions can introduce suitable ecotypes with high yield for stressed conditions. Thus, Kerman ecotype was found suitable for stressed conditions and appeared to cope better with moisture stress and Esfahan ecotype showed a better ability to unstressed conditions. They can be utilized through appropriate selection in breeding programs for further improvement in drought tolerance of cumin ecotypes.

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INVESTIGATION OF GROWS RATE AND ANTIFUNGAL EFFECTS OF
GANODERMA LUSIDUM ON PLANT PATHOGEN KARST
(BASIDIOMYCOTA)

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Ganoderma lucidum has many pharmaceutical properties which are used to cure heart and Cardiovascular diseases, reduce blood pressure and diabetes and also it's used for its antimicrobial effects. This research has done due to several antifungal/antagonistic properties of *Ganoderma lucidum* and lack of data in this field in Iran. In this study, growth rate ($GR = \Delta d / \Delta t$) and antifungal/antagonistic effects of *Ganoderma lucidum* were evaluated. In this order pour culture of this mushroom achieved by tissue culture of fruiting body which collected on *Carpinus betulus* from alangdare forest areas of Gorgan city. Antifungal activities experiment has been done against 7 plant pathogenic fungi (*Macrophomina phaseolina*, *Fusarium oxysporum*, *Fusarium culmorum*, *Funerea estoliopsis*, *fusarium verticillioides*, *Bipolaris sorokiniana*, *Sclerotinia sclerotiorum*) in dual culture on MEA and 3 replications. Type and severity of each dual culture were evaluated in 4 groups. The results showed, *G lucidum* growth rate was 4.3 mm/day. The most Antifungal effects has been seen on *Fusarium oxysporum* causing of wilt diseases of *Cucumis sativus* and *Sclerotinia sclerotiorum* causing of *brassica napus* and In contrast, the lowest antifungal activates has been seen on *Fusarium culmorum* causes ear blight disease on cereal crops and *fusarium verticillioides* causing of wilt of maize.



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EFFECTS OF *ARTEMISIA DRACUNCULUS* ON THE CLOTTING TIME

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Nowadays, herbaceous sources are considerable as replacement of chemical materials in the medicine and foodstuffs and the plants anti sore effect finding that they had eatable and medicinal consumption traditionally is very important. There are many reports in the reliable sources of medicinal plants about *Artemisia dracunculus*, but now there aren't any researches about these plants effect on the clotting time. This study purpose is local effect consideration of aquatic and hydro alcohol extract of *A. dracunculus* medicinal plant on the blood clotting time in adult male rat.

The water and methanolic extracts and essential oil of *A. dracunculus* were extracted with using a soxhlet and clewenger apparatus respectively. The test of blood coagulation time determination was studied by Tube test method with all of the samples. The results indicate that the blood clotting time significantly decreased in the treatment group with essential oil and methanolic extract *A. dracunculus* in comparison to control. But, the water extract don't effect on blood coagulation time. There are significant differences between the water extract to essence and methanolic extract at the level of 5% ($P < 0.05$). We suggested that, this plant can use in the wound amendment and other bleeding injuries.

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**THE EFFECTS OF EXPLANTS AND GROWTH REGULATORS ON
CALLUS INDUCTION OF *LIPPIA CITRIODORA* L., AN IMPORTANT
MEDICINAL PLANT**

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lippia citriodora L. is an important and valuable medicinal plant belonging to Verbenace family(1). This plant produces a few seeds rarely or does not produce any seed. Also, seed cultivation lead to genetic segregation in next generations because of being a cross pollinates species (2). However, tissue culture could be suitable approach way for propagation and genetics improvement of this plant. With use of *in vitro* culture, we can produce lots of healthy plants and also it is the first step in molecular genetic breeding methods. The aim of this study was investigate of callus induction in *l. citriodora*. For callus induction apical meristem, young stems with buds and young petiole with a part of leaf as our explants were placed on MS medium containing various combination of plant growth regulators such as NAA (0, 0.5, 1 and 2 mg.l⁻¹), 2,4-D (0, 0.5, 1 and 2 mg.l⁻¹) and BAP (0, 1 and 2 mg.l⁻¹). It's necessary to use both auxine and cytokinin in media for callus induction. Our evaluation in this study shown that 1 mg.l⁻¹ NAA and 1 mg.l⁻¹ in combination with apical meristem, 0.5 mg.l⁻¹ NAA and 2 mg.l⁻¹ in combination with apical meristem, 1 mg.l⁻¹ NAA and 1 mg.l⁻¹ in combination with young petiole, 2 mg.l⁻¹ NAA and 2 mg.l⁻¹ in combination with apical meristem and 0.5 mg.l⁻¹ 2,4-D and 1 mg.l⁻¹ in combination with young petiole these five have had the best responses to callus induction.

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**AQUATIC AND ALCOHOL EXTRACT EFFECT CONSIDERATION OF
EQUSETUM ARVENS ON THE WOUND AND SKIN INFLAMMATIONS
AMENDMENT**

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Nowadays, herbaceous sources are considerable as replacement of chemical materials in the medicine and foodstuffs and the plants anti sore effect finding that they had eatable and medicinal consumption traditionally is very important. There are many reports in the reliable sources of medicinal plants about *Equisetum arvens* but now there aren't any researches about these plants effect on the cutting wound. This study purpose is local effect consideration of aquatic and hydro alcohol extract of *E. arvens* medicinal plant on the cutting wound amendment in adult male rat.

The Ethanolic and methanolic extract of *E. arvens* was extracted with using a soxhlet apparatus, and its components determined by Thin Layer Chromatography (TLC) method. In this experimental study used of male rats from Vistar rate. The rats were divided into five groups, consist of: placebo, negative control (Vaseline), positive control (vit A+D) and six treatment groups that treatment by *E. arvens* extracts. The wound making with cutting by two centimeters length and with epidermis thickness made on the side skin of animals. Witness group don't received any drug. The negative control, positive control and treatment groups medicated by *Local Therapy* with Vaseline and vit A+D and hydro alcohol (ethanol and methanol) of *E. arvens* respectively. Wound amendment process consideration 24 hours after wound making to wound perfect amendment in 10th days accomplished daily.

We are preparing the ointment by cream base (Vaseline) from extracts. Extracts had a meaningful increase ability of *wound healing* in comparison to control group. We can deduct from the results that the methanol and ethanol extracts of *E. arvens* can decrease the time of wound healing in rats. The ethanolic and methanol extracts has been effectiveness to control group. These extracts caused in the Epiderm formation acceleration and so wound amending; meanwhile we don't observe any mark of keloid and even Scar. By considering results complete extract of *E. arvens* has an important role in the wound amendment.

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**THE COMPARISON THE EFFECTS OF HUMIC ACID AND
THIOBACILLUS BIOFERTILIZER ON MORPHOLOGICAL
CHARACTERISTICS ON TWO SPECIES OF *THYMUS*
(*T. VULGARIS* AND *T. KOTSCHYANUS*)**

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Thymus is one of the most important of medicinal plants that we may see many of its wild species in the nature of Iran with a wide dispersion. We used two important species of thymus in this examine that includes: *Thymus vulgaris* and *Thymus kotschyanus*. *T. kotschyanus* is used as traditional medicine among people. The chemical composition of Thymus extract reveal that carvacrol represent the most important compound in the oil, that is found as 44.2% by Meriçli [3] and, as 53-70% by Başer[2]. This extract also contains p-cymen (7%), γ -terpinene (6%) and thymol (6%) [1]. Nowadays organic culture of plants particular in medicinal plants is a noteworthy topic in all over the word. We saw the seed in trays and after 1.5 months we transplanted them in the pots in four replication at the greenhouse. Also we used two fertilizer treatments in two level for each one that includes: Humic acid (HA) and Thiobacillus biofertilizer (with or without fertilizers). This test has been carried out as factorial in method randomized complete block design. The traits that we measure in this examine includes: leaf number, Plant height, crown diameter, Branch number, Plant wet weight, Plant Dry weight and plant dry weight rate. The results of Data analysis were as follows. The variation in leaf number trait, we see the significant increases in the treatment HA and without Thiobacillus in both species but we didn't observe any significant changes in the other form of treatments and other trait on two species. All traits difference between species are significant except plant dry weight rate that we didn't see any difference.

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**ANTIOXIDANT ACTIVITIES OF SOME PEPPER
(*CAPSICUM ANNUUM* L.) VARIETIES PHENOLIC EXTRACTS**

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Peppers contain moderate to high levels of neutral phenolics or flavonoids, phytochemicals that are important antioxidant components of a plant-based diet, other than traditional nutrients, that may reduce the risk of degenerative diseases [1]. Antioxidant activity in 3 different colored (yellow, orange and green) sweet bell peppers (*Capsicum annuum* L.) were investigated. Peppers were selected from those in Shahreza of Esfahan. The experiments was carried out to evaluate changes the total phenolic content [2], flavonoid content [3], reducing power [4], scavenging activities of 2, 2-diphenyl-1-picrylhydrazyl (DPPH) [5]. The results indicated that total phenolic content not significantly different in green and orange but yellow had lower than others. Flavonoid content in green peppers was higher than others. Reducing power in orange peppers was higher than green and yellow peppers. Scavenging activities of DPPH radicals not significantly different in various cultivars.

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ANTIOXIDANT AND TOXICOLOGICAL EVALUATION OF
HYDROETHANOL EXTRACT OF *TROGOPON BUPHTHALMOIDES*
AERIAL PARTS

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Trogopogon buphthalmoides is a widely used herbal medicine and food seasoning in Iran. The leaves of *Tragopogon buphthalmoides* prevents from stomach bleeding, it is useful for rheumatism and the water of it's flower has the healing power for burning. The root of *tragopogon buphthalmoides* is musilagenous and a little bitter, and eating it increases the appetite significantly. Despite the prevalent food and medicinal use of the plant, there are no reports on the possible toxic effects of *E. Platyloba*. To provide information on the safety of *E. Platyloba*, we have evaluated its acute and sub-chronic toxicity in male and female Wistar rats.

The plant samples were ground to fine powder and brewed with ethanol 70% for 24 hour. At first, H₂O was removed and then the extract was concentrated to dryness via eliminating MeOH by rotary evaporator. For toxicological evaluation four week old Wistar rats of both sexes were acclimated to holding facilities for 2 weeks prior to dosing. The animals were fasted for 4 h prior to dosing. The extract was administered by gavage at single doses of 2gr/kg body weight. Rats were observed for clinical signs prior to dosing, at post-dosing 1, 2, 3, 4, 5, 6, 7 and 8 h; and daily thereafter for 14 days. They were also monitored daily for mortality and any additional behavioral or clinical signs of toxicity. Animals body weight were measured prior to dosing and on days 7 and 14. On day 15, rats were sacrificed by decapitation and liver, heart, spleen and kidney of all animals were removed and weighted. All of the rats treated with different concentrations of total extracts of *tragopogon buphthalmoides* were alive for all 14 days of observation. Normal body weight gains were observed in the males and females of all of the dose groups. No abnormal gross findings were observed in any of the animals. Conclusion: The obtained results showed that oral acute toxicity of *E. platyloba* total extract was, therefore, considered as unclassified, since a dose of 2 g/kg did not induce deaths or toxic symptoms.



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AQUATIC AND ALCOHOL EXTRACT EFFECT
CONSIDERATION OF *EPHEDRA INTERMEDIA* ON THE WOUND AND
SKIN INFLAMMATIONS AMENDMENT

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Nowadays, herbaceous sources are considerable as replacement of chemical materials in the medicine and foodstuffs and the plants anti sore effect finding that they had eatable and medicinal consumption traditionally is very important. There are many reports in the reliable sources of medicinal plants about *Ephedra intermedia* but now there aren't any researches about these plants effect on the cutting wound. This study purpose is local effect consideration of aquatic and hydro alcohol extract of *E. intermedia* medicinal plant on the cutting wound amendment in adult male rat.

The Ethanolic and methanolic extract of *E. intermedia* was extracted with using a soxhlet apparatus, and its components determined by Thin Layer Chromatography (TLC) method. In this experimental study used of male rats from Vistar rate. The rats were divided into five groups, consist of: placebo, negative control (Vaseline), positive control (vit A+D) and six treatment groups that treatment by *E. intermedia* extracts. The wound making with cutting by two centimeters length and with epidermis thickness made on the side skin of animals. Witness group don't received any drug. The negative control, positive control and treatment groups medicated by Local Therapy with Vaseline and vit A+D and hydro alcohol (ethanol and methanol) of *E. intermedia* respectively. Wound amendment process consideration 24 hours after wound making to wound perfect amendment in 10th days accomplished daily. We are preparing the ointment by cream base (Vaseline) from extracts. Extracts had a meaningful increase ability of wound healing in comparison to control group. WSe can deduct from the results that the methanol and ethanol extracts of *E. intermedia* can decrease the time of wound healing in rats. The ethanolic and methanol extracts has been effectiveness to control group, but the activity of methanolic extract was more than the ethanolic extract. These extracts caused in the Epiderm formation acceleration and so wound amending; meanwhile we don't observe any mark of keloid and even Scar. By considering results complete extract of *E. intermedia* has an important role in the wound amendment.

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**STUDY ON DIFFERENT LEVELS OF ANNATTO SEED MEAL
(*BIXA ORELLANA*) IN THE DIET ON SOME BIOLOGICAL INDICES
OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)**

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In the recent years, identification and optimization of feed supplements used in the aquafeed industries as stimulastors of growth and immune system and color quality of fillet are considered as an important area in the nutrition of aquatic species. In this regard, astaxanthin (AX) is the most popular synthetic pigments. High cost, low bioavailability and variable purity have limited the use of AX in the industry[1].In the present study, the potential of annatto (AN) seed meal as a natural pigment in the diet of rainbow trout (30 ± 2.7 g) was compared to that of AX based on the some biological indices including growth performance (specific growth rate, %/day), immunological indices (lysozyme and complement) and fillet quality. Five inclusion levels (mg/Kg) of AN (50, 100, 150, 200 and 250)and AX (30, 40 and 65) together with a basal diet (control) were used in the diet for 63 days.Results showed that immunological indices including lysozyme and complement levels of the serum of fish fed the diet containing 200 mg/Kg increased ($10.8 \mu\text{g/ml}$ and 13.7 unit/ml, respectively) significantly ($P \leq 0.05$) compared to all inclusion levels of AX (mean: $9.9 \mu\text{g/ml}$ and 11.8 unit/ml, respectively) and control diet ($9.5 \mu\text{g/ml}$ and 10.1 unit/ml, respectively). Using 200 mg/KgAN increased the final weight (187.8 ± 3.8 g) compared to all inclusion levels of AX (mean: 128.5 ± 3.1 g) and control group (121.5 ± 3.1 g). Specific growth rate fish fed the diets containing 200 mg/Kg AN ($2.4\%/day$) increased significantly ($P \leq 0.05$) compared to all inclusion levels of AX (mean: $1.9\%/day$) and control diet ($1.8\%/day$).The color quality of fillets (based on the L.a.b indices) of fish fed the diets containing different levels of AN improved significantly ($P \leq 0.05$) compared to other treatments.Based on the results, using 200 mg/Kg AN in the diet of rainbow trout was possible.

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**CYTOTOXIC EVALUATION OF 24-HYDROPEROXY-24-VINYL
CHOLESTEROL ISOLATED FROM *NIZAMUDDINIA ZANARDINII*, A
BROWN ALGA FROM OMAN SEA**

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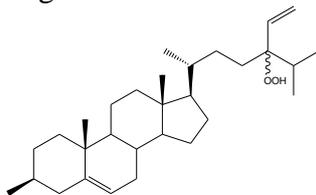
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The brown alga, *Nizamuddinina zanardinii* (Schiffner) P.C. Silva, was collected from Oman Sea (region of Chabahr), dried, reduced to small pieces and extracted with MeOH. Bioguided fractionation of the methanolic extract of this alga led to the isolation of a hydroperoxy sterol. Its structure was determined by analysis of the spectroscopic data as 24-hydroperoxy-24-vinyl cholesterol (HVC). In vitro cytotoxic activity of HVC was evaluated against HT29, MCF7, A549, HepG2 and MDBK cell lines. The compound exhibited cytotoxicity in all cell lines (IC₅₀, 3.62, 9.09, 17.96, 32.31 and 37.31 µg/mL respectively). HVC was also evaluated for apoptotic activity and demonstrated positive results in terminal deoxynucleotidyl transferase dUTP Nick End labeling (TUNEL) assay suggesting it a candidate for further apoptotic studies.



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**EFFECTS OF SALICYLIC ACID ON TOTAL PHENOLIC AND
ROSMARINIC ACID CONTENTS IN LEMON BALM
(*MELISSA OFFICINALIS* L.) PLANTS EXPOSED TO NICKEL STRESS**

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Lemon balm (*Melissa officinalis* L., Lamiaceae) is a well-known medicinal plant mainly due to two groups of compounds, the essential oil and the phenylpropanoid derivatives. Rosmarinic acid (RA) is a prominent phenolic compound of *M. officinalis* which is the dimer form of an ester of caffeic acid and 3, 4-dihydroxyphenyllactic acid. Rosmarinic acid shows a number of interesting biological activities and antioxidant, anti-inflammatory, antiviral and antimicrobial properties of RA have also been reported [1]. This study was undertaken to determine the phenolic content and RA contents in leaves of *M. officinalis* plants treated with salicylic acid (SA) during Ni-induced stress. Sterilized seeds were transferred into pots and irrigated with Hoagland nutrient solution, under glasshouse conditions. Plants at 6-8 leaf stage were treated with different concentrations of Ni (0, 25, 50, 75, 100, 250, 500 μ M) every alternate day and SA (0 and 1000 μ M) mixed with tween-20 was sprayed in the evening of the same day. After two months, leaf samples were extracted in methanol and total phenolic content of extracts were determined spectrophotometrically [2]. Hydroalcoholic extracts of the dried and powdered samples were prepared for analysis of RA [3]. A HPLC method was developed to determine the content of RA in extracts. The results indicated that RA content slightly increased with increasing of Ni concentration and reached to 3.05 mg/g dry weight in 500 μ M Ni. Total phenolic content was increased with increasing of Ni concentration as expected, except for the concentration of 75 μ M Ni (9/83 mg/g). The highest total phenolic content was observed in 500 μ M Ni concentration (23.15 mg/g). With increasing Ni concentration, exogenous SA significantly decreased total phenolic content, as well as RA content in stressed plants. Our data suggest that phenolic compounds as potent antioxidants play an important role in the metabolism of *M. officinalis* to survive under heavy metal pollution. The toxic effects of Ni were however alleviated by the exogenously applied SA thereby underscoring the beneficial role of this signal molecule in mediating defense response in plants under stress [4].

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**DETERMINATION OF TOTAL PHENOLIC AND SCAVENGING
ACTIVITY OF FREE RADICALS IN 4 SPECIES FRUITS OF
SOLANACEAE**

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Lipid oxidation is one of the most important reasons of food decendence, which affects color, taste, tissue and nutrient value[1]. In foods these reactions could cause decendence and losing of food value(by destructing vitamins A, D, E and essential fatty acids) and producing toxic compounds and colorful products. The purpose of this study was to determine total phenolic content and antioxidant activity in metanolic extracts in 4 species of Solanaceae (*Solanumtubersum*, *S.nigrum*, *S.dulcamara*, *S.melongena*). Total phenolic and flavonoid content were determined using the folin-ciocalteau and $AlCl_3$ respectively. The highest and lowest phenolic contents, flavonoid, reduction power and scavenging of DPPH was observed respectively in *S.dulcamara* and *S.tubersum*.

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DETERMINATION OF ANTIOXIDANT ACTIVITIES OF
TWO *ADONIS* SPECIES

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The genus *Adonis* L. belongs to the Ranunculaceae family and divide into two sections (consisting perennial and annual species). Iran has been regarded as the main biodiversity centre of the annual species in the world [1]. On the other hand, perennial species are evaluated as important medicinal plants while there is a little medicinal information about annual ones [2]. Thus, some phytochemical studies were performed on two widespread species of the genus (*A. flammea* and *A. aestivalis*) in Iran.

Antioxidant activity of plant extracts in most cases depends on total phenol and flavonoid content. Measuring these amounts in medicinal herbs might be proper reference for their antioxidant effect. Methanol extracts of the aerial parts of two *Adonis* species were obtained by ultrasonic method extraction and then the yields of extracts were calculated. Total phenol and total flavonoid contents were evaluated according to the Folin-Ciocalteu procedure, and a colorimetric method, respectively [3]. The antioxidant activities were determined by DPPH (1, 1-diphenyl-2-picryl-hydrazyl) method [4,5]. The two species were shown similar antioxidant activity with IC₅₀ value about 180 µg/ml. Total phenol content of *A. flammea* was higher than *A. aestivalis*, while *A. aestivalis* showed a higher amount of flavonoid content than the other one. Results showed both species have high antioxidant activity (IC₅₀ < 200 µg/ml) and have great amounts of total phenol and flavonoid compounds lead to more potent radical scavenging effects.

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**IN VITRO CHANGES OF CHLOROGENIC AND CAFFEIC ACIDS OF
ARTICHOKE UNDER SALIN STRESS**

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Artichoke (*Cynara scolymus* L.) is a medicinal plant belongs to Asteraceae family. This plant is utilized for nutritional as well as pharmaceutical purposes mostly due to high antioxidant activity. In the present study *in vitro* changes of two important flavonoid compounds (chlorogenic and caffeic acids) were estimated under salinity. The 28 days old calli were transferred to the Ms medium supplemented with different levels of sodium chloride (0, 50, 150, 300, 600 and 1200 μ M NaCl). The results revealed that salinity significantly influenced chlorogenic acid content. Contrary to that, no significant difference was observed on the caffeic acid. No correlation was observed among these compounds and antioxidant activity of methanolic extract. It seems that due to high salinity tolerance of artichoke, the levels of salinity were not big enough to make significant difference among antioxidant agents.

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EFFECT OF PGPR INOCULATION ON THE QUALITY AND QUANTITY OF SUMMER SAVORY (*SATUREJAHORTENSIS* L.)

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One group of biofertilizers is a Plant Growth Promoters Ryzobacters (PGPR). *Saturejahortensis* belong to the Lamiaceae family. To examine the effect of PGPR on the shoot yield and yield of essential oil yield of Summer Savory an experiment was performed under field conditions in 1391 at the Research Institute of forests and rangelands of country, Alborz research station. This experiment was performed a randomized complete block design model with three replications. In this experiment, was used of the bacterial genera *Azotobacter* (*Azotobacterspp*), *Azospirillum* (*Azospirillum spp*) and *Pseudomonas* (*Pseudomonas spp*) in 8-level (non-inoculated, inoculated with *Azotobacter*, *Azospirillum*, *Pseudomonas*, *Azotobacter* and *Azospirillum* integration, *Azotobacter* and *Pseudomonas* integration, *Azospirillum* and *Pseudomonas* integration, and integrating all three bacteria) were used as inoculum with roots in initiation stemming stage. Effect of PGPR inoculation on the essential oil yield, root length, wide-spreading root diameter, root dry weight at 1 percentage level and on plant height, stem diameter, weight and essential oil yields were significant at the 5% level. Comparison means of treatment showed that the highest yield of shoots, flowering shoot, leaf, inflorescence and essential oil of the flowering shoot respectively, with the 3758.1, 2687.1, 450.98, 1398, 701.65 kg/ha, essential oil output (2.43 %) and weight percentage of essential oil (2.33%), were related to combine all three bacteria and the highest root dry weight (3.6 g), diameter, width and length of the root, respectively, with the 1.08, 43.9 and 29.12 cm, were related to the combination of *Azotobacter* and *Pseudomonas*. Results from this study showed that in order to achieve maximum shoot yield and essential oil yield can be used of combination of all three bacteria.



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**THE ECONOMIC RESULT OF TRAGACANTH ASTRAGALUS AND
SELL PRODUCT**

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Take advantage from secondary products of forests and rangelands has been done from the past. Medicinal plants are one of secondary products of forests and rangelands that improve richness of rangelands. These plants are used in traditional medicine. Tragacanth is one of the important medicinal and industrial products of Iran's rangeland, which is obtained from Tragacanth *Astragalus*. Tragacanth uses in the pharmaceutical, loom, food, paper, cosmetic industries.

The study area was performed in Ghezlarkhani rangeland is located in from 9.55 km of SW Vanak village, Semrom County. The total area of the region estimated 36.1101 hectares by using the software GIS, 902.94 ha of that is cover with white and yellow Tragacanth. The main purpose to protect and reclamation grasslands, is Employment and shape of the traditional operation. Beneficiaries can harvest the Tragacanth through the accordance with the technical and management expertise Department of Natural Resources for 60 days. The operation area divided into two parcels. The production of yellow Tragacanth estimated 57 gram per M² , so total production of Tragacanth estimated 159255.93 Kg. This project leads to the employment 436 workers and 1 supervisor during a 3-year period through the Authorized operation in a season (60 days) and Reform and reclamation Implementation. Also 23 hectares of the total area must be under reclamation and reformed. Total Gross income from the project was 4618520942 Rials by subtracting 3831890707 Rials as cost including wage labor, transportation, supervision of expert observers and reclamation operations and state share under the ownership interest that deposit to the treasury , the amount of net income of 1383320928 Rials from tragacanth operating gained Contract enforcement.

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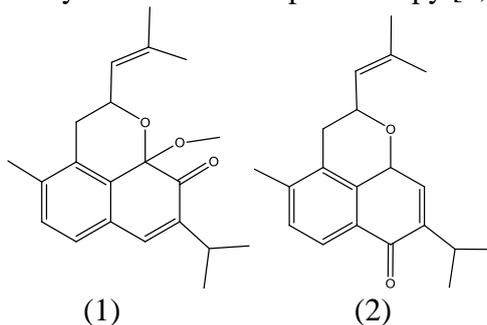
TWO NEW DITEPENOIDS FROM THE ROOT OF
SALVIA CHLOROLEUCA

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Salvia is one of the large genus in lamiaceae family. Fifty eight species of the genus *salvia* are found in Iran, of which 17 are endemic. *Salvia chloroleuca* Rech. f. & Allen was collected in Sahrestanak, the center of Iran. *Salvia* has the antimicrobial and anti inflammatory effect. The root of this plant cut into small pieces, dried and extracted with acetone. The extracts subjected to column chromatography on Silica gel and HPLC. Two new rearranged tricyclic abietan diterpenoid(1) 8-isopropyl-9a-methoxy methyl-2-(2-methylprop-1-enyl)-2,3-dihydrobenzo[de]chromen-7(9aH)-one and (2) 8-isopropyl-4-methyl-2-(2-methylprop-1-enyl)-2,3-dihydrobenzo[de]chromen-7(9aH)-one were isolated and identified by NMR and MS spectroscopy [1,2].



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EFFECT OF PUTRESCINE SPRAYING ON THE QUALITY AND QUANTITY OF SUMMER SAVORY (SATUREJAHORTENSIS L.)

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Putrescine is a polyamine, polyamines are a new group of plant hormones that nowadays known as plant growth regulators that are involved in many developmental processes. *Saturejahortensis* belong to the Lamiaceae family. In order to identify the effects of putrescine on shoot yield and essential oil yield of Summer Savory an experiment was performed under field conditions in 2012 at the Research Institute of forests and rangelands of country, Alborz research station. This experiment was performed a randomized complete block design model with three replications. Salicylic acid as a foliar application in five levels (0, 50, 100, 150 and 200 mg/l) in three stages (initiation of stemming, early stage of budding, initiation of flowering stage) was applied. Putrescine spray effect on canopy diameter, stem diameter, total dry weight, leaf and inflorescence dry weight, yield of the shoot, flowering branches, leaves and inflorescences, weight percentages of essential oil output and essential oil yields of flowering branches at 1 percentage level and on number of lateral stem, plant height and root dry weight were significant at the 5% level. Comparison means of treatment showed that the highest, the yields of shoots, flowering branches, leaves, inflorescences, respectively, with the 4593.3, 3284.2, 459.33, 1593.9 kg/ha leaf area (4676.54 cm²/m²), number of inflorescences (315.33 n/p) and number of leaves (1131.3 n/p) were related to 200 mg/l concentration and the highest essential oil output (2.35 %) and essential oil yield of flowering branches (76.76 kg/ha) were related to the 150 mg/l concentration. The results showed that in order to achieve maximum shoot yields and essential oil yields, respectively, can be used of 200 mg/l and 150 mg/l concentrations of putrescine.



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EFFECT OF SALICYLIC ACID SPRAYING ON THE QUALITY AND QUANTITY OF SUMMER SAVORY (SATUREJA HORTENSIS L.)

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Satureja hortensis belong to the Lamiaceae family. salicylic acids an organic compound that was found in plants, affects plant physiological activities. In order to identify the effects of salicylic acid on shoot yield and essential oil yield of Summer Savory an experiment was performed under field conditions in 1391 at the Research Institute of forests and rangelands of country, Alborz research station. This experiment was performed a randomized complete block design model with three replications. Salicylic acid as a foliar application in four levels (0, 1, 2, 3 mM/l) in three stages (initiation of stemming, early stage of budding, initiation of flowering stage) was applied. Effect of foliar application of Salicylic acid on plant height, canopy diameter, stem diameter, total dry weight of leaf and inflorescence, total yield of flowering branches, leaves and inflorescence, leaf number, leaf area and number of inflorescences at 1 percentage level and on weight percentages of essential oil, essential oil output and essential oil yields of flowering branches were significant at 5% level. Comparison means of treatment showed that the highest plant height, canopy diameter, stem diameter, respectively, with the 45.07, 39.33, 0.92 cm, the yields of shoots, flowering branches, leaves, inflorescences, respectively, with the 5070.4, 3625.3, 709.85, 1739.1 kg/ha, leaf area (7543.03 cm²/m²) number of inflorescences (311.67 n/p) and number of leaves (1668.6 n/p) were related to the 3 mM concentration and the highest weight percentages of essential oil (2.16 %), essential oil output (2.35 %) and essential oil yield of flowering branches (66.91 kg/ha) were related to the 1 mM concentration. The results showed that in order to achieve maximum shoot yields and essential oil yields, respectively can be used of 3 mM and 1 mM concentrations of Salicylic acid.



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**STUDY OF PHYSIOLOGICAL AND BIOCHEMICAL RESPONSES
OF SAFFRON (*CROCUS SATIVUS L.*) TO SALT STRESS AND
ALLEVIATIVE EFFECTS OF SALYCILIC ACID**

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Saffron (*Crocus sativus L.*) belongs to the Iridaceae family. Its valuable dried spice that accumulates in the stigmas is widely used for coloring and flavoring many foods. It has a long medicinal history as part of traditional healing; several modern research studies have hinted that the spice has possible anticarcinogenic (cancer-suppressing), anti-mutagenic (mutation preventing), immunomodulating, and antioxidant-like properties. *Crocus sativus* corms were grown in *Perlite* and watered by half-strength modified Hoagland nutrient solution containing 0, 50, 100, 150, 200 mM NaCl. All plants remained alive and did not display any sign of foliar damage even at 200 mM NaCl. However, the salinity decreased growth, relative water content and increased contents of protein and superoxide dismutase (SOD). Also, the ameliorative effect of SA (Salicylic acid) on growth of crop plants under abiotic stress conditions was checked, exogenously applied 0.5 mM SA as a foliar spray could ameliorate the adverse effects of salt stress on *Crocus sativus*. SA has caused increase in relative water content, protein content and SOD activity.

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**THE EFFECT OF SELENIUM (SO₂) ON IONIC CONTENT OF
MELISSA OSSICINALIS**

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The importance of medicinal plants and their deficit in nature makes the survey of various agricultural aspects of this plant necessary. *Melissa ossicinalis* is one of the most important medical plants that are used as tranquillizer and for curing cordial, intestinal and gastric diseases. We studied the effect of selenium on this plant. The experiment was performed in hydroponics conditions. Experiment was conducted based on completely randomized design with three replications. Plants were treated with different levels of selenium (0, 5, 25 μ m). The effect of Selenium on *Melissa*'s ionic content was studied. The results show that selenium causes to increase K⁺ in shoot and decrease it in root, decrease Ca²⁺ in both root and shoot and increased Mg²⁺ in shoot but it was decreased in plant's root [1 and 2].

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**OF GENE FLOW AND GENETIC DIFFERENTIATION AMONG
POPULATIONS OF SPECIES ANTHEMIS TINCTORIA USING
PEROXIDASE ISOZYMES**

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Chamomile is the importance of medicinal plants in different climatic regions of Iran broad Prandgyis. Species Anthemise Tinctoria of the family Asterace, It is an herbaceous perennial Golden Chamomile is commonly known. This plant is one of the important medicinal plants and aromatic. Inthisstudy, 50 of isozyme spattern genotype Seed population of 5 (found in Natural Resources Gene Bank) were analyzed by PAGE. Based onthe results Table Gene flow and genetic differentiation among populations of these tables were drawn by the software GENALEX. By comparing the two tables we Between genetic differentiation and gene flowis an inverse relationship. When Genetic differentiation is high gene flow placed in its lowest. The population studied in this research Two populations with high gene flow with miyane and the sardasht of 24/15 Genetic differentiation minimum value0/01 were This indicates a high similarity between the two is acrowd. Due to the high gene flow between populations, perhaps as that the two populations have the same origin but living in two separate areas. The population of the naghade 3 & naghade 1 Following minimum levels of gene flow 0/348 and the maximum amount of genetic differentiation was established 0/418 That is, the fact Despite the fact that these two people live in one are a but not genetically related.

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**EVALUATING THE GERMINATION OF ARTEMISIA POPULATIONS
IN DIFFERENT TEMPERATURES AND POLYETHYLENE GLYCOL**

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Seeds of different artemisia (*Artemisia sieberi* Besser subsp) populations were collected from Karaj (10, 25 and 35°C) and six drought stress levels induced by polyethylene glycol (0, -2, -4, -6, -8 and -10 MPa). Analysis of variance indicated that population, temperature and drought significantly affected germination percentage, germination speed, seed vigour index and seed germination index. Mean comparison of populations indicated that the highest plumule length (2.28 cm), radicle length (7.10 cm) and seed vigour index (5.24) were achieved in Tehran population. Seeds of Ghom habitat had lower germination percentage, speed and seed vigour index compared with the two other populations. Mean comparison of temperatures showed that the highest germination percentage (59.53%) and germination speed (0.85 seeds/day) were achieved in 25°C and the lowest value of these traits was achieved in 35°C (31.70% and 0.45 seed/day, respectively). Among the drought stress levels, 0 and -2 bar had the highest germination percentage (66.48 and 60.85%, respectively) and the highest germination speed (0.94 and 0.86 seeds/day, respectively). Seed vigour index was the highest in -0.2 bar (6.06). Seed vigour index was the lowest in -10 bar (4.22). Studying the effect of drought stress indicated that artemisia seeds germinated better under normal conditions. Non-significant differences in most of the measured traits between 0 and -2 bar indicates that artemisia can tolerate mild drought stress at germination stage.



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ALLEVIATIVE EFFECTS OF SALYCILIC ACID**

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Saffron (*Crocus sativus L.*) belongs to the Iridaceae family. Its valuable dried spice that accumulates in the stigmas is widely used for coloring and flavoring many foods. It has a long medicinal history as part of traditional healing; several modern research studies have hinted that the spice has possible anticarcinogenic (cancer-suppressing), anti-mutagenic (mutation preventing), immunomodulating, and antioxidant-like properties. *Crocus sativus* corms were grown in *Perlite* and watered by half-strength modified Hoagland nutrient solution containing 0, 5%, 10%, 20% PEG. Relative water content (RWC) was significantly reduced under water stress condition. Increase in the free proline content during water stress condition suggests that proline is one of the common compatible osmolytes under water stress condition. However, the drought stress decreased growth but increased contents of protein and superoxide dismutase (SOD) activity. Ameliorative effect of SA (Salicylic Acid) on growth of crop plants under abiotic stress conditions was checked, exogenously applied 0.5Mm SA as a foliar spray could ameliorate the adverse effects of water stress on *Crocus sativus*. SA has caused increase in relative water content, protein content and SOD activity.

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**A STUDY OF GENERATIVE ORGANS CHARACTERISTICS OF
AVICENNIA MARINA (FORSK.) VIERH (AVICENNIACEAE)**

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Avicennia marina is a viviparous plant that has grown in Bushehr and Hormozgan provinces in Iran. This study was performed on *Avicennia marina* grown in Bushehr province. Morphological studies detected that the inflorescence is compound spike. Flowers are orange yellow, sessile, bisexual, actinomorphic and regular. Calyx and corolla are composed of five polysepalous sepals and four gamopetalous petals respectively. Androecium has four epipetalous stamens. Each stamen is composed of filament and two lobed another. Ovary is superior and dumbbell shaped. Fruits are capsule, spherical to ovoid with short apical beak. SEM analysis revealed that dorsal and ventral surfaces of sepals and ventral surface of petals don't have trichomes but margins of sepals, dorsal surfaces of petals and the surface of ovary are covered with trichomes. The surfaces of inflorescence axis and fruits are covered by squamiform trichomes. Epicuticular wax, like small plates is seen on the stamen filament. Anatomical studies showed that ovary has two carpel with four anatropous ovules. Globular, club, heart and torpedo shaped embryos is seen in this plant but torpedo stage, like other viviparous plants has amplified. Anther wall is composed of five layers: an epidermis, an endothecium, two middle layers and one layer of tapetum. Middle layers are ephemeral and tapetum layer is dimorphic (secretive and ameboid) that is a rare type of tapetum layer. Pollen development in *Avicennia marina* is basic type. SEM analysis of pollens showed that pollens are spherical in polar view and ovoid in equatorial view. They are tricolporate and the ornamentation of exine is perforate. The kind of inflorescence, the number of sepals and petals are in accordance with Ghosh et al., (2008) findings. Borg and Schonenberger (2011) like our observations saw trichomes on ovary. Ovary and ovule structure in this plant are in agreement with Padmanabhan (1960) who observed two carpeled ovary and anatropous ovules in *Avicennia marina*. Das and Ghose (2003) observed amplified torpedo stage in some Indian mangroves that are in accordance with our results. Our observations about tapetum layer are in consistent with Furness (2008), who observed dimorphic tapetum layer in some Asterids. SEM results about pollen morphology are similar to Magalhaes e silva and Riberio dos santos (2009) findings in *Avicennia germinans*.

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**HISTOPATHOLOGICAL CHANGES OF SPLEEN IN PCOS FEMALE
RATS TREATED WITH AQUEOUSEXTRACTION OF
*FOENICULUM VULGARE***

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Foeniculum vulgare is a well-known herb that has been used for centuries for hormonal imbalances in women because it helps stimulate and stabilize the function of the pituitary gland. The seeds of *Foeniculum vulgare* are the part normally used. Also it has been used as traditional herbal medicine for Poly Cystic Ovary Syndrome (PCOS) treatment. The phytoestrogens components of this plant may support the immune system, inhibit angiogenesis, and protect against oxidative damage as antioxidants. In this research, side effect of *F. Vulgera* on spleen is evaluated in experimental PCO rats.

40 female rats were randomly divided into five groups: C: non PCO, received normal diet. 2) F: non PCO gavaged with *F. Vulgera* 150 mg/kg bw. 3) P: PCO, received normal diet. 4) PF1: PCO treated with 150mg/kg bw *F. Vulgera*. 5) PF2: PCOS treated with *F. Vulgera* 100 mg/kg bw orally for 4 weeks. PCO was induced by IM injection of estradiol-walerate (4mg/rat). At the end of the treatment period, the animals were sacrificed and their spleens were removed, fixed, sectioned and stained with H&E. The sections were studied with light microscope. In the PCOS groups, bleeding and damage to the red pulp was seen by accumulation of Hemosidrin particles, also in these groups, number of macrophages around the central artery in the white pulp was increased. While in F and PF1 groups the symptoms of PCOS were improved and histopathological changes in spleen were not observed and all of previous signs were improved and was similar to control group. This research showed that aqueous extraction of *Fennel* has a positive effect on the immune system and protect spleen from damage in PCOS female rats. Aqueous extract of *Fennel's* seed found to prevent the histopathological changes of spleen associated with PCO rats.



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SEMI-PREPARATIVE LC-MS OF TAXANE DITERPENOIDS

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Taxanediterpenoids are the best known compounds of natural origin, which has been employed in the pharmaceutical industry; they are extracted from different parts of yew trees (Taxaceae), cell cultures, and Taxane-producing endophytic fungi. Paclitaxel is the most important compound of this group. It kills tumor cells by enhancing the assembly of microtubules and inhibiting their de-polymerization. It has been widely applied in the clinical treatment of various malignant tumors such as breast cancer, ovarian carcinomas, skin cancer, and non-small-cell lung cancer [1]. There are many reports in which many kinds of separation and purification methods for these most demanding compounds are used [2].

Although HPLC is mainly used for the determination of main Taxoids from both plant materials and biological fluids, it is difficult to separate some Taxoids well because of their similar structures. Therefore, it is necessary to develop a reliable and short-term method for the simultaneous determination of these compounds [3]. LC-MS is a powerful instrument in natural product research in which mass analyses could be used for determination of known compounds [4]. In this study, solid phase extraction with C18 stationary phase was used as a clean-up step. Taxane Purification is carried out using analytical HPLC. Then this procedure scaled up to semi-preparative SPE-HPLC and analyzed using LC-MS system. Base on this method, four important Taxane including Paclitaxel, Cephalomannine, 10-deacetylbaccatin III, baccatin III were determined.

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**INFLUENCES OF DROUGHT STRESS ON SEED GERMINATION
PARAMETERS IN (*RUTA GRAVEOLENS* L.)**

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In order to study competition and find the influence of drought stress on germination parameters (rate and percentage) for *Ruta graveolens* L. an experiment was performed randomized complete block design with 3 replications. The experiment treatments were included of drought levels (0, -2, -4, -6, -8 and -10 bar). The results showed that drought stress showed significant effects on germination and seedling growth of *Ruta graveolens*. The seeds were able to germinate in -10 bar matric potential condition. The effect of stress on rate and germination percentage, root and shoot length seedling were significant and with increasing drought stresses, rate and germination percentage, length of radicle and plumule decreased. Increasing drought level, led to higher plumule length reduction compared to radicle length reduction, which shows that *Ruta graveolens* L. plumule is more sensitive to droughtness than radicle. rate and germination percentage of seedling at -6 bar was 93% and 78% of control plants, length of radicle and plumule decreased 90% and 100% compared to control treatment.



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**FABRICATION OF ALBUMIN NANOPARTICLES CONTAINS MODEL
DRUG**

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Cancer is the second leading cause of death in developing countries and the leading cause of death in economically developed countries [1]. Despite a lot of advances in the last decade, the development of innovative targeted therapies and the design of rational drug delivery systems continue to be researched intensely [2]. One of the main goals of nanomedicine is to develop safe and effective drug carriers that are systemically applied but will selectively deliver cytotoxic drugs to tumor cells without harming normal cells [3]. Albumin is a biodegradable, biocompatible, and nonantigenic protein. In this work, the formulation of Albumin nanoparticles containing a model drug (Tamoxifen citrate) was performed. The nanoparticles were prepared based on an O/W emulsification method using a homogenizer instrument. Scanning Electron Microscopy (SEM) and particle size analysis (Nanophox^R, DLS) were used for nanoparticles characterization. According to the US pharmacopeias for Tamoxifen citrate, loading and efficiency were measured using an analytical HPLC technique. Albumin nanoparticles within the size 100-200 nm were prepared with drug loading of 8.8% w/w and efficiency of 71%.

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OPTIMIZATION OF IN VITRO REGENERATION OF SOME *SALVIA*
SPECIES VIA NODAL EXPLANTS CULTURE

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Salvia is an important genus belongs to Lamiaceae family, which widely cultivated and used in aromatic and traditional medicines. The members of the genus have attracted great attention that they have been the subject of several phytochemical studies. They are rich sources of phenolic compounds, especially phenolic acids. The majority of the phenolic acids in *Salvia* species are caffeic acid derivatives, some of which are unique to the genus [1]. In this project, we studied the effect of some growth regulators on micropropagation of the medicinal species of *S. officinalis* and two wild species of *S. nemorosa* and *Salvia hypoleuca* in order to establish a protocol for high shoot regeneration. Seeds of two wild species were sterilized in different concentrations of sodium hypochlorite and were cultured on basal MS medium. Seeds of *S. officinalis* were cultured in small plastic flowerpots and four leaf- stage plantlets were sterilized in sodium hypochlorite. Nodal explants which were excised from the four leaf stage seedling samples, were cultured on MS basal media containing different combinations of NAA(0.1 and 0.2 mg/l) + BAP (0.5 , 1 and 1.5 mg/l) or IAA(0.1 and 0.2 mg/l) + BAP (0.5 , 1 and 1.5 mg/l). Results from statistical analysis of data indicated that the highest number (4.11 ± 0.11 per explant) of proliferated shoots with the highest length (7.09 ± 0.47) and leaf number (21.11 ± 0.58 per explant) were obtained for *S. officinalis* nodal explants that were cultured on MS medium containing BAP (0.5 mg/l) in combination with IAA (0.1 mg/l). The highest number of regenerated shoots (5.8 ± 0.41 per explant) were also formed on nodal explants of *S. nemorosa* that were cultured on a MS medium containing BAP (1.5 mg/l) in combination with IAA (0.1 mg/l). Nodal explants of *S. hypoleuca* that were cultured on MS medium supplemented with BAP (1.5 mg/l) and NAA(0.1 mg/l) showed the highest number of regenerated shoots (3.5 ± 0.14 per explant). This is the first report on high frequency *in vitro* regeneration of wild *Salvia* species of Iran. Our protocol would be useful for clonal propagation and genetic transformation of *Salvia* species, as well production of various secondary metabolites with biological activities.

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MEDICINAL AND ANTIOXIDANT PROPERTIES OF KERNEL AND GREEN SHELL A MONG SOME PISTACHIO GENOTYPES

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In recent years, a trend of emphasize on of minimum the use of chemical and synthetic compounds in foods and also replacing with natural compounds has been the core of many researchs, Many attempts have been made to find natural antioxidants in plant materials. Phenolic compounds, especially those extracted from plant, becoming a part of human diets. In this study, 20 genotypes and varieties of pistachios of the district part of Feizabad in Khorassan were sampled. Results showed that the genotypes were significantly different for studied characters. The genotype “Garme riz” had the highest phenol content at 35.64 mg of gallic acid per gram of dried samples and also the maximum antioxidant content at 90.55 percent. Among the genotypes studied, the genotypes “Garme riz”, “Sefid subuni1” and “Momtaz” were superior to others for interion component. These results indicated the high nutrition qualities of pistachios and of the green testae of pistachio nuts. These qualities can be used in breeding programs or direct usage nutrition and medicinal.

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COMPARISON OF CHEMICAL CONSTITUENT OF ESSENTIAL
OIL OF *STACHYS LAVANDULIFOLIA* VAHL FROM
KABOODARAHANG AND ROODSAR

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The essential oil of *Stachyslavandulifolia* Vahl (Lamiaceae) collected from the suburb Kaboodarahang, Hamedan province (west of Iran) and suburb of roodsar, Gilan province (north of Iran) were isolated by hydrodistillation of the aerial parts of the plant. The chemical composition of volatile oil was analyzed by capillary GC and GC/ MS. The yields of the essential oil were 2.3% and 0.7%, also, thirty-one and sixty-two compounds were observed in Kaboodarahang and Roodsar samples, respectively.

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**EFFECT OF ECOTYPE ON TOTAL PHENOL AND FLAVONOIDS
CONTENT OF *SAMBUCUS EBULUS* LEAVES**

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Sambucus ebulus is perennial herbaceous plant with unpleasant odor and belongs to caprifoliaceae family. In folk medicine the plant is used for different purposes such as anti-rheumatism, anti-fever, anti-infections. *Sambucus ebulus* is mainly spread in north of Iran. To see the effect of ecotype on total phenol and flavonoids content of *sambucus ebulus* leaves, plants samples were collected from three different provinces of northern Iran (Gilan, Golestan and Mazandaran). The collected samples were dried in room temperature and dark conditions. The fine grounded samples were used for methanolic extract preparation and the total phenol and flavonoids content of extract was measured using spectrophotometer. Statistical comparison showed that maximum flavonoid content (0.223 mg/g) was recorded in the samples of Gorgan (altitude 1800MSL). Contrary, the highest amount of phenol was observed in the plant samples of Mazandaran, distributed in altitude of 2000MSL. Higher humidity in Gilan could be the reason why the content of measured parameters is low.

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ANTICANCER ACTIVITY EVALUATION OF THE
ACINOSGRAVEOLENS AERIAL PARTS

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Many of biologically active compounds with great therapeutic potential and providing molecular basis for most of drugs currently in clinical use are natural products isolated from plant spices [1]. The genus *Acinos* (Lamiaceae) is represented by 10 species distributed over Mediterranean regions toward Central Asia and Iran [2], some of them are traditionally used in Mediterranean countries [3]. In Iran, two species of this genus exist, *Acinos arvensis* (Lam.) and *A. graveolens*. *Acinos graveolens* is an annual dwarf herb which is widely distributed in Iran and neighboring countries [4]. The purpose of the present study is to evaluate methanol extract of *Acinos graveolens* for its anticancer activity. The plant was collected from valleys of Qamsar at the time of flowering. Methanol extract was obtained with Soxhlet extractor. A brine shrimp lethality bioassay was carried out to investigate the cytotoxicity of the extract [5]. The assay showed an LC₅₀ value of about 240 µg mL⁻¹ representing moderate anticancer activity for the plant.

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**PHENOTYPIC VARIATION OF COLOCYNTH ACCESSION FROM
DIFFERENT IRAN GEOGRAPHICAL AREA OF
(*CITRULLUS COLOCYNTHIS*)**

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In order to study some phenotypic traits of Colocynthplant that isgrown in different areas of Iran an experiment was conducted in field condition. Thirty accession of Colocynth seeds were collectedfrom areas that they appears naturally from Northern part to Southern. In spring season seeds were planted in three replications with two observations in each replicate inCompletely Randomized Block Design. In the end of experiment fruit characters of all accessions wasrecorded .Analysis of results showed that there was more variation among Colocynth plant and even betweenaccessions from same province.By analysis of results among accession there were more variation in fruits traits andmaximum weight,total fruit diameter and holediameter was obtained from Khorasgan(5). There were positive correlation between fruit length and weight and also fruit area and hole diameter.Most of the accession clustered based on geographical area .According to this study we observed high diversity among colocynth accession that could be useful as genetic resources for complementaryphytochemical and breeding studies.



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PHENOLIC CONTENT AND DPPH RADICAL
SCAVENINGACTIVITY AND TOTAL PROTEIN OF *CUCURBITACEAE*
IN IRAN

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The radical scavenging activity, phenolic content and soluble protein of Iran medicinal plant used in remedy for various ailments, particularly, as a treatment against worms [1], Namely *Cucurbita pepo*, *Cucurbita maxima*, *Cucurbita moschata* (*Cucurbitaceae*) was determined in Iran. Pumpkin seeds are used to treat tapeworm, where the dried seeds are eaten in an empty stomach and extracts from pumpkin seeds, *C. pepo*, have been used in folk medicine as a remedy for micturition caused by Benign Prostatic Hyperplasia (BPH)[2]. Soluble protein was determined by Lowery protein assay. By measuring the scavenging effect on 2,2 diphenyl-1-picrylhydrazyl (DPPH) radical, methanolic extract of plants exhibits the highest radical scavenging activity is in *C. pepo* and highest soluble protein content and total phenolic content was found in *C. maxima*. Phenolic content was determined using the Folin-ciocalteu reagent and gallic acid as a standard.

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**THE EFFECT OF WATER DEFICIT AND SPRAYING ON
AGRONOMIC TRAITS AND YIELD OF DRAGONHEAD**

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In this experiment, irrigation treatments in main plots, including both normal irrigation and cutting irrigation at flowering stage, were studied. In sub plots, spray was divided into three levels of methanol, salicylic acid and distilled water. Measured traits included plant height, weight of stem, leaf, seed and --heads. Analysis of variance indicated that irrigation effects on all traits, while there was no significant interaction between the treatments. Normal irrigation treatment was the highest in all traits. Also spray with salicylic acid indicated the highest value of plant height, leaf, stem, seed and heads amounts. The lowest value of plant height was recorded 36.7, sprayed with distilled water. According to the results, maximum economic yield was emphasized in normal irrigation. Also it was indicated that in case of drought, especially in reproductive spray cycle, salicylic acid can greatly prevent product reduction.

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INVESTIGATION OF ANTI-INFLAMMATORY EFFECT OF N-
HEXANE EXTRACT OF LEAVES OF *ZIZIPHORA*
CLINOPODIODES.LAM ON NMRI MALE MICE

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Ziziphora Clinopodiodes (ZC) is a plant, belong to labiatae family [1] Recent research on this plant has shown its different thraputic effect .The plant is used as, stomachic, antifever, antiinflamatory, sedative and flavoring agent in Iranian folk medicine[2].The aim of this study was to evaluate the Anti-inflammatory effect of ZC extract on male mice. This study has been done on NMRI male mice of 20-25 g in weight. We used Xylene-induced ear edema Test for demonstrating its Anti-inflammatory effect. In this test, mice were divided into 5 groups (each group consisting of 8 mice):Sham, Positive Control, experimental groups. Experimental groups receiving extract at doses of 250,500 and 1000 mg/kg. Also, Positive Control receiving dexametasone at dose of 15 mg/kg in inflammatory test. The results showed that extract reduced inflammatory meaningfully in both acute and chronic phases. It is concluded that the N-Hexane extract of *Ziziphora Clinopodiodes* has Anti-inflammatory effect, and this effect may be flovonoid and terpenoid [3, 4] components in this plant, which have Anti-inflammatory properties.

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**EVALUATION OF THE ANTIOXIDANT ACTIVITY OF THE
ACINOSGRAVEOLENSAERIAL PARTS FROM QAMSAR AREA**

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Antioxidants play important roles in the scavenging of free radicals and/or chain breaking of the oxidation reactions both *in vivo* and *in vitro*. The inhibition of oxidative reactions in food, pharmaceutical and cosmetic products and the prevention of oxidative stress related diseases in the human body are some of the useful potential functions of antioxidants [1]. Regarding the importance of natural antioxidants, antioxidant assays were done on methanol extract of *Acinos graveolens* from Lamiaceae family. The antioxidative potential of plant was evaluated using two methods: a) inhibition of 2,2-diphenyl-1-picrylhydrazyl (DPPH) stable free radical and b) β -carotene-linoleic acid assay. Total phenolic content of the plant extract was also determined by Folin-ciocalteu reagent (FCR) as gallic acid equivalents [2,3]. Methanol extract of the plant showed good activity in DPPH assay ($IC_{50} = 50.34 \mu\text{g/ml}$) compared to that of synthetic standard antioxidant BHT ($IC_{50} = 16.13 \mu\text{g/ml}$) and moderate activity in β -carotene-linoleic acid assay with inhibition percentage of 46.13%, about half of that of BHT (95.6%). Total phenolic compounds content of the extract was also measured and a value of about $51.04 \mu\text{g/mg}$ was resulted showing low phenol content for the plant.

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**THE RELATION OF TRAITS IN ARTEMISIA OF TEHRAN PROVINCE,
IRAN**

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In this experiment, artemisia plants at full flowering stage were collected from Tehran natural habitat by the means of nine plots. Morphological traits such as plant height, the number of tillers, maximum and minimum canopy diameter, flowering shoot yield and total shoot yield were measured over 20-40 plants. Chlorophyll, soluble sugars, proline, Na, K, Mg, Ca and Cl contents were also measured in each plot. Determining the correlation of the measured traits indicated that root length was significantly correlated to the number of tillers and the minimum and maximum canopy diameter. Flowering shoot yield had significantly positive correlation with total shoot yield, root weight, total biomass and total chlorophyll content, and significantly negative correlation with Na, K and Ca. Total biomass had significantly positive correlation with total chlorophyll content and negative correlation with Na, K and Ca. Essential oil percentage was significantly correlated to proline content. Soluble sugars had significantly positive correlation with proline and Cl and negative correlation with total chlorophyll and chlorophyll a. Proline was significantly correlated to Na and Cl. Total chlorophyll content had significantly negative correlation with Na, Ca and Cl. Chlorophyll a had significantly positive correlation with chlorophyll b and negative correlation with Na, Ca and Cl. Na was significantly correlated to Mg, Ca and Cl. Ca was also significantly correlated to Cl. Principal component analysis indicated that the first four prin contributed to more than 95% of the total variations (57.59, 18.08, 11.32 and 8.06%, respectively). Stepwise regression analysis indicated that three traits including proline, Mg and soluble sugars entered the model respectively. In path analysis, the direct and indirect effect of all entered traits to the model of stepwise regression analysis was evaluated based on the correlation coefficients; proline had the highest direct effect (0.876) on essential oil percentage.



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**STUDY OF DIFFERENT DRYING METHODS ON ESSENTIAL OIL
AND MENTHOL CONTENTS OF PEPPERMINT**

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Peppermint (*Mentha piperita* L.) is an aromatic and medicinal plant that has high Menthol content. This medicinal plant is often used in tea and for flavouring ice cream, confectionery, chewing gum and toothpaste. In order to evaluation the impacts of drying methods on drying time and qualitative characteristics of peppermint, an experiment was conducted at the Special Laboratory, College of Agriculture, Ferdowsi University of Mashhad during 2012 based on completely randomized design with six replications. Leaves dried at three temperature with oven (30, 40 and 60°C) and natural methods (shaded and sunny airs). The drying process was continued until the moisture content of leaves reduced about 10% based on dry weight. The results showed that the effect of different drying methods was significant ($p \leq 0.01$) on essential oil and Menthol contents of peppermint. By increasing in oven temperature was declined drying time for leaves. The highest essential oil and Menthol contents were observed in shaded air (with 3.1 and 64.1%, respectively) and their lowest were for 60°C oven (with 1.5 and 21.1%, respectively).

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**GENETIC DIVERSITY AMONG NAKED SEED OF
CUCURBITA PEPO VAR. *STYRIACA* AND COMPARISON WITH
OTHER VARIETIES OF *PEPO* SPECIES**

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Cucurbita pepo var. *styriaca* is known as medicinal crop among other cucurbits and in Iran has been cultivated many years ago by local farmers in some parts of Iran. In this experiment some accessions of naked seed from different part of area cultures were chosen. In order to determine variation between and among of *pepo* varieties different accessions of *pepo* species also were collected. All collected seeds were planted in 19th of March in 2012 in three replications with two observations in each replicate in Block Completely Randomized Design. After fruits ripening they harvested and moved to laboratory for analyzing their morphological and some physiological characters. Based on results most of the fruits characters of naked seed type showed genetic variation and in comparison with other type of *pepo* accessions, maximum seed hole diameter, fruit weight and wide were observed in naked seed accession. Ward analysis of culture revealed close relation between naked seed type and one accession of Marand while other accession segregated from all naked seed type. Based on this study we can demonstrated that there are high genetic variation in naked seed type and have close relationship with some accession of *Cucurbita pepo* var. *pepo* that could be due to cross pollination and multi culture of all cucurbits by local farmers.



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**EFFECT OF OSMOPRIMING WITH KNO₃ ON SEED GERMINATION
OF *LALLEMANTIA ROYLEANA***

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Germination of balangu (*Lallemantia royleana*) is a critical factor influencing seedling establishment when seeded directly in fields. In this research, priming with osmotic solution was used to improve the germination percentage of balangu. The aim of this study was to develop techniques that improve the germination of *Lallemantia royleana*. Seeds were subjected to priming in aerated beakers with different solutions of KNO₃ including 0 (distilled water), 0.1, 0.3, 0.5 and 1 % at 25°C for 24, h. Germination test was performed according to methods of the International Seed Testing Association. Seeds were considered germinated when radicles emerged at least 2 mm. Seedling quality was evaluated after 14 days in respect to the number of normal seedlings. Parameters related to germination, such as maximum germination (G_{max}) and mean germination time (MGT), Germination rate; root length and shoot length were measured. Data were analyzed using MSTATC program. Probability of significant differences among treatments and interactions by Duncan test (p<0.05) were used to compare means within and among treatments. Results showed that osmoopriming increased MGT. Shoot length increased with increasing osmotic potential to 0.3% followed by a decrease in higher water potentials. Germination percentage and root length did not influenced by priming with 0.3% KNO₃ solution. Priming with KNO₃ increased shoot length by 140% compared to control (hydropriming). It is assumed that increment in MGT induced by increment of seed osmotic potential. The results were agree with the finding of Abdollahi and Jafari (2012). It is concluded that priming with 0.3% KNO₃ has the ability to improve seedling growth by shoot length increment.

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**STUDY ON SEED MORPHOLOGICAL MARKERS OF NAKED SEED
AND OTHER CUCURBITS TO EVALUATE GENETIC VARIATION**

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Seeds characters of cucurbit crops have main role as markers to segregate different genotype and accession. One of the important traits is present and diameter of sclerenchyma tissue of seeds. In this investigation anatomical and morphological characters of 30 accessions of cucurbits belong to *pepo* species including naked type and other types were evaluated in completely randomized design. Most accessions from Northern part of Iran (Gilan) showed thicker sclerenchyma tissue versus to west and southern parts. Between naked seed types Khomein accession had highest weight, length and diameter. Seed skin color and shape also were more variable and showed positive correlation with wide and diameters of seed (%1). Most of the evaluated characters were more effective to separation and estimation of genetic variation between and among all accessions.



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**COMPARISON OF THE EFFECTS OF DROUGHT AND SALINITY
STRESS ON FENNEL SEED GERMINATION UNDER
HYDROPRIMING CONDITION**

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Study of the salinity and drought tolerance in medicinal plants is very important for cultivating them under stress conditions. Fennel (*Foeniculum vulgare* Mill), a medicinal plant, is of great importance in world and being use in various industries, pharmaceutical, food, and cosmetic [1]. In order to evaluate the effect of drought and salinity stresses on fennel seed germination in hydropriming condition, two experiments were conducted in factorial base on completely randomized design with four replications at the Seed Technology Laboratory of Yasouj University, Iran, in 2012. Treatments were included of two priming levels (zero and hydropriming) for both experiments and PEG 6000 in six levels (-0.24, -0.48, -0.97, -1.46 and -1.95 bar) for and salinity at four levels (0, 50, 100 and 200 mM NaCl) for drought and salinity imposition respectively. PEG levels were selected equals on osmotic potential of NaCl levels [2]. Results showed that the interaction of drought stress and priming was significant for germination percentage, vigour, stem length, shoot, root and cotyledon dry weight. Interaction of salinity stress and priming was significant only for cotyledon dry weight. By increasing salinity up to 200 mM, fennel seed germination percent and rate tend to zero, but the rate of decline for this trait was less than in higher levels of drought stress. So that -1.95 bar PEG compared to control imposed only 28% reduction in germination rate. Salinity stress significantly decreased germination index, so that the amount reached zero at 200 mM NaCl level. However increasing drought stress levels to -1.95 bar had little effect on this trait. Generally results showed that effect of ion (Na^+ , Cl^-) toxicity on fennel germination was higher than osmotic potential.

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EVALUATION OF ALLELOPATHIC ACTIVITY OF
JUNIPERUS SABINA

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Many of the gymnospermous trees are reported to exhibit allelopathy. The allelopathic potential of *Juniperus sabina* was studied. The experiment was arranged in a randomized completely design with threereplication. The treatments of essential oil at 6 levels include 250, 500, 1000, 2000, 5000 ppm and 0 as control. Seed germination, germination rate and some seedlings growth parameters (shoot length, radical length, fresh weight) under different concentrations of radish (*Raphanus sativus*), cress (*Lepidum sativum* L.) and lettuce (*Lactuca sativa* L.) were measured. The results showed that the treatments significantly reduced germination and germination rate in all three plants will be tested. The radish seedlings were the most sensitive to the essential oil. The highest germination and germination rate of *Raphanus sativus* (75% - 11.4), *Lepidum sativum* (95% - 18.8) and *Lactuca sativa* (90% - 17.2) occurred in the control while the lowest germination and germination rate of *Raphanus sativus* (10% - 0.8), *Lepidum sativum* (25% - 3.5) and *Lactuca sativa* (50% - 9) occurred in the 5000 ppm treatment. The inhibition increased with increasing essential oil concentration. These results suggesting that *Juniperus Sabina* may contain growth inhibitory substances and possess allelopathic activity [1,2].

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**EFFECT OF ETHANOLIC EXTRACT OF BARBERRY ROOT
(BERBERIS VULGARIS)ON RENAL TOXICITY OF THE DRUG
CISPLATIN**

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Cisplatin is consumed drug in the treatment of cancer. Only limited use of that is renal toxicity due to oxygen free radical production. In recent years many studies have been made to decrease the side effects of that by using medicinal plants and several approaches have been proposed to increase the efficiency of the drug. In this study the effect of ethanolic extract of barberry root, which contains the alkaloid called Berberine with the effects of antioxidant and anti-cancer on cisplatin-induced renal toxicity has been identified. A total of 24 male rats divided into three groups of 8 numerically and in the same conditions hold. The first group, only saline was administered, the second group, only cisplatin and the third group was given alcoholic extract of barberry root, before cisplatin .After a week, urea and creatinine of blood samples were measured, and then groups of animals were sacrificed and kidney lesions were measured in groups. In group only cisplatin, renal tubular necrosis and increase rate of urea and creatinine blood samples was observed. The alcoholic extract, barberry root, before administration of cisplatin, inhibition of renal tubular necrosis and decrease in blood urea and creatinine were observed. The results showed that the alcoholic extract of roots of barberry contain alkaloids Berberine, protects kidneys against cisplatin toxicity. More *in vitro* and *in vivo* experiments is essential to investigate the effect of simultaneous administration of Cisplatin and extract of barberry root on renal toxicity of cancer patients



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**IN VITRO PLANT REGENERATION IN *LINUM ALBUM*
KOTSCHY EX BOISS AN IMPORTANT MEDICINAL PLANT: FIRST
REPORT**

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Linum album of the member Linaceae is an herbaceous Iranian endemic medicinal plant, containing some lignans with antiviral and anticancer properties [1]. Its seeds showed remarkable variations in either germination or growth. Hence, a method for micropropagation of *L. album* through plant regeneration from leaf derived calli has been developed, aiming to achieve genetically uniform mass propagated materials. Calli were initiated from leaf explants of young plant on Murashige and Skoog (MS) [2] culture medium supplemented with 2 mg l⁻¹ naphthalene acetic acid (NAA) and 0.4 mg l⁻¹ kinetin (kin), 30 g l⁻¹ sucrose and 8 g l⁻¹ agar at 25°C in the dark. The calli were then transferred to MS medium supplemented with 6-benzyladenine (1-2.5 mg l⁻¹ BA) either alone or in combination with 0.2 mg l⁻¹ NAA for shoot regeneration. The 2.0 mg l⁻¹ BA was identified as more effective on shooting. These shoots were transferred to MS medium supplemented with 0.2 mg l⁻¹ kin to produce multiple shoots. For rooting of the shoots, half-strength MS medium supplemented with different concentrations (0.5-2 mg l⁻¹) of indole 3-acetic acid (IAA), indole 3-butyric acid (IBA) or NAA alone were examined. The optimal result was distinguished on half-strength MS medium supplemented with 1 mg l⁻¹ NAA. This is the first report of regeneration of *L. album* callus. The regeneration protocol developed in this study provides a basis for germplasm conservation and for further investigation of medicinally active constituents of *L. album*.

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CALLUS INDUCTION FROM DIFFERENT PARTS OF MILK
THISTLE(*SILBUM MARIANUM L.*)

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Milk thistle (*Silbummarianum L.*) is a one or two year plant, belongs to the Asteraceae Compositae family, which has a simple or branched stems with large, shiny, and toothed leaves, which has pink and purple tubular flowers. Milk thistle native vegetation is in Western Europe, Central and North India and nowadays in Africa, China and Australia and in some parts of Iran including Mazandaran. The alcoholic extract of the plant contains flavonoids, such as silymarin. Not only Milk thistle has liver protective effects, but also it does have antioxidant, anti-bacterial and anti-inflammatory effects. Callus production methods for medicinal plants are useful methods in genetic conservation and propagation of these plants to produce more secondary metabolites, biomass production, and providing research areas for biotechnology and pharmaceutical sector. One of the promises of this study, is the induction of Milk thistle callus to proliferate and produce medicinal plants. Thus, a factorial experiment in a completely randomized design (CRD) with 3 replications was used. Then hypocotyl, stem and young leaves of plant were used to induce callus on MS medium with different concentrations of the hormones like 2,4 D, Kinetin, NAA and BAP, and their combinations. Results revealed that the best callus induction was achieved when stems were used (54%) followed by leaves (15%). The biomass and the rate of callus induction with various concentrations of the hormones were analyzed by spss program.

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ANTICANCER ACTIVITY OF *NIGELLA SATIVA*

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The seeds of *Nigella sativa*, commonly known as black seed or black cumin, are used in folk (herbal) medicine all over the world for the treatment and prevention of a number of diseases and conditions that include asthma, diarrhoea and dyslipidaemia. The seeds contain fixed and essential oils, proteins, alkaloids and saponin. Much of the biological activity of the seeds has been shown to be due to thymoquinone, the major component of the essential oil, but which is also present in the fixed oil [1]. Thymoquinone has been investigated for its antioxidant, anti-inflammatory and anticancer activities in both in vitro and in vivo models since its first extraction in 1960s. Its anti-oxidant/anti-inflammatory effect has been reported in various disease models, including encephalomyelitis, diabetes, asthma and carcinogenesis. Moreover, thymoquinone could act as a free radical and superoxide radical scavenger, as well as preserving the activity of various anti-oxidant enzymes such as catalase, glutathione peroxidase and glutathione-S-transferase [2]. Chemosensitization by thymoquinone is mostly limited to in vitro studies, and it has potential in therapeutic strategy for cancer. The results favor efficacy and enhancement of therapeutic benefit against tumor cells resistant to therapy based on cellular targets that are molecular determinants for cancer cell survival and progression.

The anti-tumor effects of thymoquinone have also been investigated in tumor xenograft mice models for colon, prostate, pancreatic and lung cancer [2]. The anticancer effect(s) of thymoquinone are mediated through different modes of action, including antiproliferation, apoptosis induction, cell cycle arrest, ROS generation and anti-metastasis/ antiangiogenesis. In addition, this quinone was found to exhibit anticancer activity through the modulation of multiple molecular targets, including p53, p73, PTEN, STAT3, PPAR-g, activation of caspases and generation of ROS[2]. There have been attempts to synthesize novel analogues of thymoquinone directed toward superior effects in killing tumor cells with more enhanced chemosensitizing potential than parent thymoquinone compound. Based on published reports, we believe that further in-depth studies are warranted including investigation of its bioavailability and Phase I toxicity profiling in human subjects. The results from such studies will be instrumental in advancing this field in support of initiating clinical trials for testing the effects of this ancient agent in cancer therapy.

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**RADICAL SCAVENING ACTIVITY AND TOTAL PHENOLIC
CONTENT OF THREE SPECIES OF PEAR(*PYRUS. L*)**

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Pyrus hyrcana fedor, Pyrus boissierina bushe, Pyrus communis are native to Northern part of Iran. This study was conducted to evaluate the antioxidant activity of methanolic extract of the plant pear (*Pyrus. L*) including leaves, fruits. Methanol was used as solvent and antioxidant effect was measured by DPPH method and total phenolic content. Total phenolic and flavonoid compounds of extract were measured by Folin-Ciocalteu and $AlCl_3$ [1]. The *Pyrus communis* fruit extract showed the better activity rather than samples in DPPH free radical. The *Pyrus communis* leaf extract showed the better activity rather than samples that maybe was due to the high content of phenol.

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**EFFECTS OF VARIOUS SALTS ON THE GERMINATION OF
*SILYBUM MARIANUM***

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Increasing human approach to medicinal plants to treat diseases, it is necessary to optimize the growth conditions of the plants. *Silybum marianum*, commonly called milk thistle, is a flowering plant belonging to the Asteraceae (Aster family) that believed to treat liver infections. Salinity was influence on seed germination and seedling establishment by reducing water potential and toxicity of specific ions such as sodium, chlorine and reduces the required nutrients such as calcium and potassium. In order to study of early growth response and seed germination of *Silybum marianum* in various salts levels, the experiment was done in factorial in the base of complete randomized design with 4 replications. Treatments included Na₂SO₄ (0, 100, 200, 300 mM), CaCl₂ (0, 100, 200, 300 mM) and K₂SO₄ (0, 100, 200, 300 mM). The results showed that different salinity levels were indicated significant differences on germination percentage. So the plant had maximum resistant at 100 mM CaCl₂, but higher concentrations reduced seed germination. This research was indicated that the average of length, fresh and dry weight in shoot and root, the cumulative rate of germination, absolute germination rate, seed vigor and total biomass was decreased by increasing salinity.

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**EVALUATION PHENOL AND FLAVONOID LEVEL IN SEVEN
GENOTYPES OF OLIVE MATURITY**

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Olive (*Olea europaea* L.), a characteristic Mediterranean species, is one of the oldest agricultural tree crops worldwide. *Olea europaea* L. genotypes are known. In fact, flavonoids, phenol, tannins, phenylethanoid glycosides and secoiridoids all found at high concentration in olive oil, appear to be capable of inducing anti-carcinogenic effects in large intestinal cancer cell models, in animals and in humans [1]. The experimental was conducted at the Hashemabad, Gorgan and Gorgan of plant production faculty. A complete randomized design with a factorial arrangement including three replications was used. The genotypes that were used in research included C₉, K₉, D₉, C₁₀, K₁₀, D₁₀ and G₄. In this investigation fruit weight, Length to diameter ratio, weight of flesh, flesh percentage, oil percentage, phenol and flavonoids were measured. The result showed that, the highest fruit weight 5.16 was measured in C₁₀ and lowest 3.24 were measured in D₉. Flesh percentage 82.93 and oil percentage 43.6 were highest in genotypes C₉ that recommended for expenses canning and oil. Measurement phenol and flavonoid [2] and read by spectrophotometer. Analysis of variance showed that the amount of phenolic and flavonoid there are significant differences between treatments. Comparison of means showed that the highest total phenol content was (0.402 mg GAE g⁻¹) in genotype D₆ and the lowest was (0.249 mg GAE g⁻¹) in genotype K₁₀. In addition the highest rate flavonoid was (0.31 mg QUE g⁻¹) in genotype C₁₀ and the lowest (0.162 mg QUE g⁻¹) in genotype K₉.



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**ALLELOPATHIC POTENTIAL OF COMMON MALLOW
(MALVA SYLVESTRIS) ON THE GERMINATION AND THE INITIAL
GROWTH OF BLANKET FLOWER, COCK'S COMB AND SWEET
WILLIAM**

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The present study was conducted to determine the effects of Common Mallow weeds aqueous extract allelopathic on the Blanket Flower, Cock's comb and Sweet William seeds germination indices. This study was done in a completely randomized design with 3 replications in the faculty of agriculture of Shahid Chamran University of Ahvaz in 2010. Sample treatment included various extract levels with a concentration of 2.5, 5, 7.5 and 10% and distilled water as a control treatment. In order to find the germination indices, the length and dry weight of plumule and radicle are defined on the basis of International Seed Testing Association. The analysis of their variance was performed with the use of sas soft ware, and the Excel soft ware was used to draw the required charts, and the Duncan test was used to compare the data average. The results indicated a meaningful difference in 1 and 5 percent statistical level. The results indicated that effect of Mallow weeds aqueous extract of Allelopathy inhibitory effects on germination and vegetative properties Blanket Flower, Cock's comb and Sweet William seeds as with increasing the concentration of Common Mallow extract reduce radicle length, plumule length, fresh weight and dry weight of radicle and plumule in various plants. The seeds germinated significantly Blanket Flower, Cock's comb and Sweet William and 2.5% in treated compared with control at 1% probability level was significantly decreased with increasing concentration, the germination rate is reduced. The water extracts of the Common Mallow had the greatest inhibitory effects on germination and primary growth of Blanket Flower, compared to those of Cock's comb and Sweet William. In all three types of seed root length and root dry weight and significantly reduced at concentrations above 2.5%. The Blanket Flower in concentrations of 5, 7.5, 10% and Cock's comb and Sweet William in concentrations 10, germination was almost completely inhibited. Allelopathic and inhibitory effects on the traits measured in Blanket Flower was a little over Cock's comb and Sweet William.

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**SPECTROPHOTOMETRIC DETERMINATION OF PHENOLIC
COMPOUNDS: A METHOD FOR STANDARDIZATION OF
*ITRIFAL-E KESHNIZI***

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Itrifal is a group of drugs traditionally prescribed in Iranian traditional medicine (ITM) for various problems. The basis of *itrifal* formulation is consisted of the mixture of dried fruits of *Terminaliachebula*, *Terminaliabelerica*, and *Embliaofficinalis* with honey and sweet almond oil [1,2]. The indication of the drug could be varied according to adding some specific herbs to the basic formulation. Coriander (*corianderumsativum*) is one of the herbs adding to *itrifal* to make *itrifal-e keshnizi*. The main indication of this kind of *itrifal* is related to brain problems [1,2]. In spite of commonness in ITM clinics, there are no united standards for this medicine. The aim of this research was to introduce a method of standardization for *itrifal-e keshnizi*. Due to the fact that main active components of *itrifal* are phenolic compounds (including tannins and flavonoids); spectrophotometric method was used for determination of total phenols. Tannins were extracted by four different solvents i.e. methanol, distilled water, ethanol, and ethanol 50%. The amount of total phenols was measured three times per day in three consequent days according to standard curve of gallic acid. For recovery validation, matrix effect was eliminated by a blank formulation containing all components of the drug except the tanniferous fruits. To evaluate the percentage of assay, the exact amount of phenols was calculated by individually measuring the amount of tannins in each fruit before using them in formulation.

The results showed that ethanol 50% could extract phenolics more effectively (60% recovery). The recovery for ethanol, methanol, and water were 47%, 33.3%, and 31.7% respectively. Inter-day and intra-day variations are small (confidence interval $\geq 95\%$). Regarding the results, the method presenting in this study is valid enough to utilize in standardization of *itrifal-e keshnizi*. Recovery percentage indicates that honey and sweet almond oil probably trap some phenolic compounds. Enhancing the recovery percentage is desirable.

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**MATHEMATICAL STUDY OF DOREMA AUCHERI EXTRACTION
WITH SUPERCRITICAL CARBON DIOXIDE**

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Supercritical technology is promisingly suggested for the separation purposes, especially for extracting the solutes from dense botanical plants parts. This process abundant advantages such as reduction of extraction time and less consumption of organic solvents make it adequate for the thermo-sensitive substances, production of cleaner extracts and environmental benignity [1, 2]. Modeling and simulation are the fundamental tools for prediction of dynamic and equilibrium behavior, optimization of operating conditions, and scaling up of chemical plants [3]. In the current paper a novel general model is utilized to estimate the efficiency and mass transfer parameters for the supercritical extraction of flavonoid compounds from *Dorema aucheri* Boiss (an Iranian native plant with medicinal properties).

Flavonoids compounds exist in several kinds of fruits and vegetables that have diverse beneficial biochemical and antioxidant effects [4]. The natural materials to be extracted like seeds, leaves, are usually pretreated like grinding or milling before loaded into the extraction bed. Therefore, the concept of broken and intact cells, which is proposed by Sovova [5], mathematically describes the extraction process of natural materials. The first and second part of the extraction curve is obtained by this model, are governed by phase equilibrium and internal diffusion in particles, respectively [5]. The fluid and solid phases equilibrium for the broken cells is dominated by the discontinuous equilibrium function suggesting by Perrut et al. [6]. Model equations were integrated numerically using Runge-Kutta method with Matlab software. Finally the ability of the model to correlate the experimental data (Kamyab Moghadas et al., 2012) [4], and the effect of some parameters was successfully investigated.

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**CHEMINFORMATICS STUDY OF NATURAL THUJONE LIKE
COMPOUNDS FOR PHARMACOLOGIC ACTIVITY**

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The GABA receptors could be defined as a class of receptors which respond to the neurotransmitter gamma-aminobutyric acid GABA. These receptors play major roles in several central nervous system diseases, for instance; anxiety, epilepsy, insomnia, schizophrenia and alzheimer as well as sleep disorders. The GABA antagonists with inhibiting action on their receptors towards balancing GABA networks could be employed as efficient drug candidate to treat mentioned diseases. Generally, this class of drugs bicuculline, flumazenil and thujone produces stimulant and convulsant properties. In current research, thujone as a natural compound from *Artemisia sieberii* essential oil was selected to be modeled by cheminformatics tools meant for introducing main structural descriptors for compounds like thujone structures. In this regard, α -thujone as structure core was utilized for chemical based similarity search with Tanimoto index > 90. Findings were categorized in a database consisting of 86 compounds. Afterward, the set of 256 descriptors were defined by DRAGON software for each compound that classified and validated based on PCA method. Following that, to construct a predictive ANN model for effective compounds on GABA receptors, 86 anti-GABA thujone compounds in addition to 18 GABA agonist compounds were modeled ($R^2 = 0.90$) by MATLAB software. Modeling based finding demonstrated 27 descriptors (MW , AMW, Se, Sp, Ss, nAT, nBT, nBO, SCBO, nCIC, nH, nR03, nR05, nR06 , nR07, nCp, nCs, nCq, nCrH2, nCrHR nCrR2, C-001, C-002, C-003, C-004, H-046 and H-052) may be defined as critical descriptors in designing novel GABA antagonists like thujone. Final analyzed data cleared two of pointed descriptors; nCs and H-052 could be most important and vital in thujone structure based function. At least, the presented descriptors could be applicable to organize and analyze current scientific data or mine novel information in finding new applications for compounds used in anti-GABA drug discovery and drug design procedures.

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**APPLICATION OF RESPONSE SURFACE METHODOLOGY FOR THE
OPTIMISATION OF ULTRASOUND ASSISTED EMULSIFICATION
MICROEXTRACTION OF FATTY ACIDS FROM POMEGRANATE
SEED**

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Pomegranate seed oil is extremely rich and nutritious oil, which may be used for internally or externally for its cosmetic and medicinal properties. Pomegranate seed extract have been popular lately for their anti-oxidant properties, and pomegranate seed oil is proving to be even more beneficial. Pomegranate seed oil contain high levels of anti-oxidants that fight free radicals and skin aging, and the oil also is a potent source of puniceic and ellagic acids. Because of these properties, pomegranate seed oil is used to heal, protect, and moisturize dry, cracked, mature, and irritated skin, bring elasticity back to the skin, and for eczema and other skin problems. Pomegranate seed oil (PSO) comprises 12-20% total seed weight [19].

In this study, the simple and high efficient ultrasound assisted emulsification microextraction (UAEME) technique was applied for separation and procencentration of fatty acids of pomegranate seed. The effect of diffident parameters such as volume of extraction solvent, extractiontemperature and ultrasonic time were investigated and optimized. A Plackett–Burman design was performed for screening in order to determine the significant variables affecting the extraction efficiency. Then, the significant factors were optimized by a Box–Behnken design (BBD) and the response surface equations were derived. In optimized condition, the extraction yield of UAEME technique was more than 8%. The extract fatty acids were subjected to transesterification before GC analysis. Then, the Fatty acid *methyl ester* was analyzed by gas chromatography–mass spectrometry (GC–MS) and optimization was performed using gas chromatography–flame ionization detection (GC–FID). The main components of pomegranate seed were puniceic acid, linolenic acid, linoleic acid, oleic acid, stearic acid and palmitic acid.

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**STUDY EFFECT OF PARSLEY (PETROSELINUM CRISPUM) AS AN
ABORTIFACIENT ON PREGNANT RATS**

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The practice of traditional medicine for the control of fertility in West Azarbaijan is based on the use of plant medicine for many years. The aim of this study is to evaluate the effect of ethanolic extract of parsly seeds (*Apiaceae*) in rats to explore its Abortifacient activity. To prepare the plant extract, 100 g of powdered seed was subjected to 1000 ml ethanol for 48 hours then filtered and dried using rotary [1]. A dose of 5mg/kg body weight was used and extract was administered orally to the followig groups: control, first DOP, second DOP, third DOP and 18th day administration[2]. A strong abortifacient activity was obseved at the tested dose level (50%). Also, extract showed itense effect on body weight, reducing it about 20-40% .

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**PHYTOCHEMICAL STUDY ON DICHLOROMETHANE EXTRACT OF
ARTEMISIA CINIFORMIS**

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Isolation of three polymethoxylated flavonoids from dichloromethane extract of *Artemisia ciniformis* is reported. The aforementioned extract had previously been shown to have cytotoxic activity against some cancer cell lines. After macerating the ground aerial parts of *A. ciniformis* with five different solvents (petroleum ether, dichloromethane, ethyl acetate, ethanol and ethanol-water, respectively) the evaporated dichloromethane extract was subjected to an open column chromatography system (normal-phase silica gel) with n- Heptane containing increasing amounts of Ethyl acetate to give twelve fractions (A to L). Preparative reversed-phase high-performance liquid chromatography (RP-HPLC) of one of the fractions (I) resulted in isolation of three compounds. Their structures were tentatively determined as polymethoxylated flavonoids by means of spectroscopic analysis including UV and ¹H-NMR. Further measurements are needed to elucidate the structures of isolated compounds.



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COMPARISON OF THE EFFECTS OF DROUGHT AND SALINITY STRESSES ON LINSEED SEED GERMINATION UNDER HYDROPRIMING CONDITION

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Linseed is the oil and medicinal plant that has been sown in Iran as Bazrak and its germination stage is sensitive to drought and salinity [1]. In order to evaluate the effect of drought and salinity stresses on flax seed germination in hydropriming condition, two experiments were conducted in factorial base on completely randomized design with four replications at the Seed Technology Laboratory of Yasouj University, Iran, in 2012. Treatments were included of two priming levels (zero and hydropriming) for both experiments and six PEG 6000 levels (-0.24, -0.48, -0.97, -1.46 and -1.95 bar), and four salinity levels (0, 50, 100 and 200 mM NaCl) for drought and salinity imposition respectively. PEG levels were selected equals to osmotic potential of NaCl levels [2]. Results showed that the interaction of drought and salinity stress and priming was significant for all the germination traits, percent, rate and uniformity of germination, seed vigor, stem, root and cotyledon dry weight except for stem length. By increasing salinity up to 200 mM, the most of the germination traits reached to zero, but at higher levels of PEG, percent, rate and uniformity of germination and seed vigor was reduced, but did not reach to zero. Linseed seeds were able to tolerate 100 mM salinity and -1.95 bar PEG. Germination percent decreased with increasing PEG levels, but this decreased was more for salinity. Stem and root dry weight in hydroprimed seeds was higher in salinity and PEG levels in comparison with non-primed seeds. Comparison of the results showed that the effects of ion (Na⁺, Cl⁻) in salt-induced osmotic stress was more evident than in osmotic potential induced by PEG, and linseed seed priming had little effect on seed germination. Understanding the response of plants to drought and salinity in germination stage, will help farmers to establish better seedling and also seed production.

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**SALICYLIC ACID AND SALINITY EFFECTS ON PROLINE CONTENT
AND GROWTH CHARACTERISTICS IN *THYMUS DAENENSIS***

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Defensive mechanisms of plants against stress induced or enhanced by the application of some chemicals to the plants. Salicylic acid has a regulatory effect on activating biochemical pathways associated with tolerance mechanisms in plants including salinity stress. The present study investigates the role of salicylic acid (SA) in inducing plant tolerance to salinity. The application of 0, 150, 300 and 450 ppm SA to *Thymus daenensis* plant via foliar spraying provided protection against 0, 50, 100 and 150 mM NaCl stress. The experimental design was factorial in the base of complete randomized design with 3 replications. Growth characteristics were investigated including height, leaf area, the root: stem ratio, fresh weight and dry weight and proline concentration. The results showed salinity had significant effect on the leaf area, fresh weight and proline content of plant. But the height, the root: stem ratio and dry weight of plant weren't affected by the treatments. Salicylic acid treatments indicated significant differences on proline and fresh weight and dry weight. But other traits did not show any differences. Interaction effects of salinity and salicylic acid revealed changes in proline and the root: stem ratio.

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**OPTIMIZATION OF ULTRASOUND ASSISTED EMULSIFICATION
MICROEXTRACTION FOR SEPARATION OF FATTY ACIDS OF
IRANIAN (BANDAR ABBAS) JATROPHACURCUS SEED**

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Jatropha curcas is a genus of flowering plants in the spurge family, Euphorbiaceae, which is native to the American tropics, most likely Mexico and Central America. The name is derived from the Greek words *iatros* (iatros), meaning "physician," and *trophe* (trophe), meaning "nutrition". It contains approximately 170 species of succulent plants, shrubs and trees (some are deciduous, like *Jatropha curcas*). Most of these are native to the Americas, with 66 species found in the Old World [1]. Mature plants produce separate male and female flowers. It is considered as a potential source of non-edible fuel producing plant along with its different medicinal properties. The seed contains 40-50 % viscous oil known as 'curcas oil' [2, 3]. The chemical composition and insecticidal activity of *Jatropha curcas* L. seed oil were evaluated using standard techniques. The oil content of the seed is more than 60%.

In this study, a new hyphenated extraction method composed of ultrasound assisted extraction (UAE) and emulsification microextraction (UAEME) was developed for the extraction and preconcentration of the fatty acids of *Jatropha curcas* seed. The effective parameters of UAEME including volume of extraction solvent, extraction temperature and ultrasonic time were optimized by using a Box-Behnken design (BBD) and the response surface methodology. Under optimized condition, the extraction yield of oil was more than 30%. The extracts with higher yield from the method were subjected to transesterification. Then, the chemical compositions of the UAEME extract were identified by GC-MS and determined by GC-FID. The compounds were identified according to their retention indices and mass spectra (EI, 70 eV). The major compounds of oil obtained by UAEME were linolenic acid, stearic acid, oleic acid, palmitic acid, arachidic acid.

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**EFFECTS OF DIETRY CINNAMON OIL (*CINNAMOMUM VERUM*)
SUPPLEMENTATION ON GROWTH PERFORMANCE IN JAPANESE
QUAIL**

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The aim of this study was to investigate the effects of dietary supplementation with cinnamon oil as growth promoter agents on growth performance in Japanese quail. Antibiotic growth promoters (AGP) were used in the poultry diet to improve their growth, performance and health for more than half a century. The utilization of antibiotics in livestock resulted in main problems such as development of antibiotic resistance in humans, drug residues in poultry body [1]. The use of AGP was banned in the European Union in 2006; therefore, it is important to research AGP replacements [2]. There is a huge variety of products for replacing AGP. Essential oil is one of the candidates for AGP replacement, so cinnamon oil was used in this study. A total of 240 day-old Japanese quail chicks were randomly allocated into 4 treatments with 4 replications per treatment and 15 quail chicks per pen. The treatments were as follows: 1) control (basal control diet, without any added compounds); 2) basal control diet +100 mg cinnamon oil/kg diet; 3) basal control diet + 200 mg cinnamon oil/kg diet; 4) Antibiotic (basal control diet + 200 mg virginiamycin/kg diet). Body weights of quails and feed intake were measured at 1, 21, and 35 days, at the same periods feed conversion ratio was calculated. The data were analyzed using GLM procedure of SAS. Supplementing 200 mg/kg cinnamon oil and antibiotic increased body weight gain of quails at 21 to 35 and 0 to 35 days of age ($P < 0.05$). The treatments fed with 200 mg/kg cinnamon oil and antibiotic diets, significantly showed better FCR compared to the other treatments at 21 to 35 and 0 to 35 days of age. Feed intake was not significantly influenced by the dietary treatments. Plant extracts have digestion and appetite stimulating properties, improving immune system and antimicrobial effects, thereby; they have positive effects on animal growth performance and health. Cinnamon oil improve body weight gain, feed intake and feed conversion ratio that are mainly related to its cinnamaldehyde content, cinnamaldehyde act as digestion stimulating factor, also it has antimicrobial activity against bacteria found in the intestine, limit the growth, and colonization of numerous pathogenic and nonpathogenic species of bacteria in the gut [3]. In conclusion, 200 mg/kg cinnamon oil can be applied as alternatives to in-feed antibiotics for Japanese quail diets.

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**PHYTOCHEMISTRY STUDY ON MEDICINE PLANT OF
ARTEMISIASIEBERI AND ASSESIND ITS ALLELOPATHIC EFFECT
ON *AGROPAYRUM ELONGATHUM* SEEDS**

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Allelopathic compounds of plant can be affecting on biochemical and physiological process of neighboring plant. Preliminary study was conducted to identify of some secondary compounds like terpenoids, saponins in medicine plant extract of *Artemisia sieberi* by standard procedure of phytochemistry. Then allelopathic effect of various concentrations viz. control, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100% of above whole plant extract was evaluated on the chlorophyll and phenols content, seedling growth, seed germination and seed vigor of *Agropyronelongatum* in the form of completely randomized design with three replications. Secondary compounds of terpenoids and saponins was identified and confirmed from whole extract of *Artemisia sieberi*. It was also observed that different concentrations of whole plant extracts significantly hampered parameters under study except phenols content at P=0.05 by ANOVA. The treatment of 100% had a highest hamper effect on seedling growth (14.91%), seed germination (36.20%), seed viability (23.33%) and chlorophyll (0.6015) content over control. It might be more organic and inorganic compounds as well as due to some secondary compounds like terpenoids and saponins which were present in this study.

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OPTIMIZATION OF MEDIA FOR *IN VITRO* CALLUS GROWTH OF
TAXUS BACCATA

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Medicinal plants have been used as one of the most important medicine resources from thousands years ago [1]. Taxol is a kind of diterpene alkaloids which is obtained from different species of *Taxus* genus. The limited number of this kind of tree and the impossibility of direct obtaining of Taxol from natural organs of the tree, because of legal prohibition of cutting yew trees, have led to in vitro culture for Taxol induction. Nowadays the culture of plant cells, tissue and organs have provided the rapid and massive proliferation of important medicine plants [1,2], and in this regard determining optimized culture medium for achieving maximum cellular growth and Taxol production is of great importance [3]. This study was conducted aiming at determining the best medium for callus growth and *Taxusbaccata* growth using two explants of stem and leaf. Three kinds of media WPM, MS, B₅ with 9 different hormonal treatments using Kinetin and 2,4-D hormones and sucrose in factorial design were applied. Research findings showed that callus growth in WPM medium with Kinetin and 2,4-D hormones with concentrations of 0.2 mg/l and 2 mg/l will lead to more favorable results.

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**EFFECTS OF METHANOLIC EXTRACT OF *FUMARIA PARVIFLORA*
AND INSECTICIDE PYMETROZINE ON *BEMISIATABACI* (GENN.)
(HEM.: ALEYRODIDAE) STABLE POPULATION PARAMETERS ON
CAL-J-N₃ TOMATO VARIETY**

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The cotton whitefly, *Bemisia tabaci* (Genn.) (Hem.: Aleyrodidae) is one of the most important pests of crops, greenhouse and ornamental plants, because it transmitted viral disease. This species distribute in all regions of Iran and damage to a variety of crops including tomatoes, and reduce their quality and quantity [1]. In this study, the effect of *Fumaria parviflora* extract on *Bemisia tabaci* (Genn.) stable population parameters on tomato variety Cal-j-n₃ was evaluated. Insecticide pymetrozine and water plus methanol were used respectively as positive and negative controls. The lethal dose 25 percent was used against adult insects. Tomato transplants with 2-4 leaves of variety Cal-j-n₃ were immersed in the *Fumaria parviflora* methanol extract, Pymetrozine and water plus methanol and then were placed in the glass cages. Thirty adults insects of the same age were released into the cages and after 72 hours the adult insects were removed and the eggs that their ages were less than 24 hours were kept and then the gender of adult insects that leaved the eggs exposed to infected plants was determined and the spawning rate of female insects was recorded daily until the end of the last day of their lives. The experiment was investigated in five replications in form of a completely randomized design, in a glass greenhouse (27±2°C, RH 50±5, 16L:8D). The stable population parameters were calculated according to Chi and Liu model (2006) [2]. The results showed that there is a significant difference between treatments at one percent level. The intrinsic rate of increase (r_m), for control, *F. parviflora* and pymetrozin were 0.081±0.001, 0.061±0.0008 and 0.033±0.001 respectively, the finite rate of increase (λ) were 1.084±0.002, 1.063±0.001 and 1.034±0.002, the gross reproduction rate (GRR) were 48.99±3.47, 39.66±1.23 and 16.74±1.232 respectively. Therefore, *F. parviflora* extract can be remarkable as an insecticide against *Bemisia tabaci* (Genn.).

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**OPTIMIZATION OF STERILE TREATMENTS FOR IN VITRO
CULTURE OF *TAXUS BACCATA* AND *T. BREVIFOLIA***

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Yew tree is a survivor of Caspian primitive forests and an extincting species with a poor natural regeneration power [2]. Yew's bark and branches contain a substance called PacliTaxol, one of the most effective anti-cancer medicines, regarding this property biotechnological approaches are used as an alternative for producing Taxol. In vitro in a completely sterile and isolated medium is an appropriate alternative in this regard. Nowadays yew's tissue culture is used as a way of producing Taxol and other dependent Tagzans in the world [1,3]. In this research different sterilizer treatments of stem and leaf explants were used for in vitro cultures of species *Taxusbaccata* and *T.brevifolia*. 9 sterilizer treatments were applied in a completely random design with three time repetition, and then explants were cultivated in PDA medium. The results of these treatments revealed that the best treatment for sterilizing stem and leaf explants for both specie regarding the lowest amount of pollution for in vitro culture is the fungicide pre-treatment Benomyl for 2 hours and then using mercuric chloride with concentration of 0.05 for 5 minutes and rinsing 3 times with sterilized water.



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**IDENTIFICATION AND MEDICINAL CHARACTERISTICS
INVESTIGATION OF SOME OF THE MOST IMPORTANT
MEDICINAL TREES, SHRUBS AND GRASS IN LORESTAN PROVINCE
(CASE STUDY IN YAFTEHKOUH, KHORRAMABAD)**

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Medicinal plants are one of very valuable resources in wide range of world and Iran natural resources. Herbal medicines against chemical and synthetic drugs have bad effects and minor side effects and or are completely harmless. This research was carried out in order to identify scientific situation of medicinal plants in Lorestan province and parallel to it to give some information about the botany of the plants. So, the investigation was performed as forest cruise in the Yaftehkouh, Lorestan province. Desired species were identified after collection using identification key. The results signified 41 medical species including *Quercus brantii*, *Acer monpessulanum*, *Amygdalus communis*, *Amygdalus scoparia*, *Crataegus meyeri*, *Ficus carica*, *Pistacia atlantica*, *Lonicera nummulariifolia*, *Pyrus syriaca*, *Pyrus glabra*, *Cerasus brachypetala*, *Vitis vinifera*, *Olea europaea*, *Daphne mucronata*, *Ziziphora clinipodia*, *Thymus kotschianus*, *Achillea wilhelmsii*, *Descurainia sophia*, *Cotoneaster loristanii*, *Ononis spinosa*, *Hordeum bulbosum*, *Salvia spp.*, *Urtica dioica*, *Echinops orientalis*, *Artemisia aucheri*, *Echium italicum*, *Rheum ribes*, *Allium jezdianus*, *Gundellia tornafortii*, *Myrtus communis*, *Astragalus spp.*, *Ferulago angulata*, *Papaver rhoeas*, *Calendula persicus*, *Colchicum persicum*, *Sambucus ebulus* *Peganum harmala*, *Allium sativum*, *Berberis vulgaris* and *Adiantum capillus*. Collected species have medicinal characteristics (body strengthen, anti-cancer, relieve indigestion, anti digestive problems, relieve bladder and urinary tract abnormalities, anti poor blood and pain relief and ...), economic value and nutrient value in the area of Yaftehkouh, Khorramabad.



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**HAPLOID INDUCTION IN MEDICINAL PUMPKIN USING GAMMA
IRRADIATED POLLENT TECHNIQUE**

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Medicinal pumpkin (*Cucurbita pepo convar. pepo var. styriaca*) is an important annual plant that belongs to Cucurbitaceae family. The seeds of medicinal pumpkin contain fatty oil, β -sitosterol and E-vitamin as active substances that are used to cure prostatic hypertrophy and urinary tract irritation. In order to study the effects of gamma irradiation of pollen on medicinal pumpkin haploid embryo induction, five gamma ray doses (25, 50, 75, 100 and 200 Gray) with three repetitions were used. 3-5 weeks after pollination extracted embryos in different forms and stages, were planted on E20 media. Liquid medium culture and direct extraction methods were investigated to embryo rescue. Liquid medium culture was found to be ineffective on embryo excising, and embryos were not visualized and identified. Moreover, contamination was observed and caused embryo loss. Results revealed that haploid production were significantly affected by gamma irradiation doses and also embryo stage. Induction of haploid embryo and plant increased significantly at 100 Gray irradiation dose of C60. There was any haploid induction in 200 Gray dose. In total 425 embryos and further 174 plants were produced, in which 67 haploid plants were validated based on chloroplast counting, Flow-cytometry technique and morphologic characteristics. All amorphous embryos had only diploid plants while cotyledon, heart, torpedo, arrow-tip, torpedo-tip, globular and stick embryos produced 8.1, 23, 48.4, 75, 87.5, 94.4 and 100% haploid plant respectively.

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EFFECT OF THYMUS EXTRACT ON MEAT QUALITY IN JAPANESE QUAIL CHICKS

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The aim of this work was to evaluate the effect of Thymus extract (*Thymus vulgaris*) on meat quality in Japanese quail. Lipid oxidation is one of the main mechanisms which effects meat quality and makes adverse changes in flavor, color, texture, and nutritive value [1]. Depending on composition of chickens diets, their meat could be contains the high value of unsaturated fatty acids, which increases the susceptibility of meat to oxidation. One of the products is malondialdehyde (MDA) that has long been considered as an index for measuring oxidative rancidity. Among all methods discussed for assessing MDA, the 2-thiobarbituric acid (TBA) is one of the most accurate one for lipid oxidation in animal tissues. As a whole, TBA content expresses MDA concentration, and it is a good index for oxidation [2]. One hundred and twenty one-day-old Japanese quail chicks were used in the experiment. Japanese quail chicks were allocated into two dietary treatment groups with four replicates, in a complete randomized design. The treatments were as follow: 1. Control (basal diet, without any added compounds), 2. basal diet + 1ml Thymus extract/Litr water. The data were analyzed using GLM procedure of SAS. At 35d, At day 35 of age, 2 male chicks per replicate (8 per treatment) were randomly selected for slaughtering and whole thigh removal. The thighs without skin were then placed in plastic bags and frozen (-23°C) for TBA test. In our experiment TBA content in the group fed with thymus extract was lower than the control diet ($p < 0.05$), and it was maybe due to thymus antioxidant properties. Studies have shown that plant extracts have antioxidant property. The antioxidant property in thymus is because of Thymol and carvacrol contents; therefore, it can improve the shelf life and the quality of meat products [3]. In conclusion, thymus extract positively influenced meat quality because of its antioxidant properties.

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**THE EFFECT OF CHAMOMILE EXTRACT ON REPRODUCTIVE
SYSTEM IN MALE MICE**

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The scientific name of the Chamomile is *Matricaria chamomile* that belongs to Asteraceafamily [1]. It has Phytoestrogens and strong antioxidant, anti-inflammatory, antibacterial, and relaxation properties. This research attempts to study the effects of hydro alcoholic extract of chamomile flowers on reproduction mice. In this research, 40 mature male mice were divided randomly into 5 groups. The control group did not receive any extract, the placebo group received 0.5 cc normal saline every other day and 3 treatment groups received extract with (100, 200, 300) mg/kg/2day doses that was used interperitoneal injection [2]. The main parameters of the hormones LH, FSH, Testosteron and testicular histology in the treated group compared to the control group. The results were analyzed SPSS in the case that $P < 0.05$. The results show that the FSH in all experimental groups has significantly decreased compared to control ($P < 0.05$). LH and Testosteron have only increased in doses of 300 mg/kg. The number of primary spermatocytes in all three dose groups showed a significant decrease compared with control ($P < 0.05$), although no tissue damage was observed in these groups. The results can be stated that chamomile extract has a significant dose dependent effect on the reproductive system in mice.

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**THE EFFEC OF BIOLOGICAL AND CHEMICAL NITROGEN
FERTILIZER ON DRY FLOWER YIELD AND ESSENTIAL OIL
CONTENT OF CALENDUS (*CALENDULA OFFICINALIS*)**

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Calendus (*Calendula officinalis*) is one of the most important medicinal plants with great applications in different medicinal industries. In order to study the effects of biological and chemical nitrogen fertilizers on dry flower and essential oil content of *Calendus*, an experiment was conducted under field condition with a factorial design as a randomized complete block design with three replications in university of Maragheh. The treatments included chemical fertilizer (0, 25 and 50 kg N /ha) and biofertilizer of Nitroxin (seed inoculation and non inoculation). Results showed that, the highest dry flower yield (530 kg/ha) obtained from non inoculation with 50 kg N/ha treatment. Nitroxin had significant effect on essential oil content. Inoculation of seed by nitroxin had the highest essential oil (0.64%) of *Calendus* that it was 33 percent more than non inoculation. Interaction effect between nitrogen fertilizer and nitroxin on essential oil yield was significant. The highest essential oil yield (2.43 kg/ha) belonged to nitroxin inoculation without chemical fertilizer application. Generally, it seems that using of biofertilizer of nitroxin can improve *calendus* performance in addition to reduction of environmental pollution.

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**TWO SEX LIFE TABLE OF ADULTS EXPOSED OF
BEMISIATABACI (GENN.) (HEM.: ALEYRODIDAE) WITH PLANT
EXTRACT *TEUCRIUM POLIUM* AND
INSECTICIDE PYMETROZINE ON ERGON TOMATO VARIETY**

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The sweet potato whitefly, *Bemisiatabaci* (Genn.) (Hem: Aleyrodidae) is a major pest of field crops, vegetables and ornamental plants[1]. In this study, the effect of *T.polium* extract on *Bemisiatabaci* (Genn.) stable population parameters on tomato variety Ergon was evaluated. Insecticide Pymetrozine and water plus methanol were used respectively as positive and negative controls. The lethal dose 25 percent was used against adult insects. Tomato transplants with 2-4 leaves of variety Ergon were immersed in the *T.polium* methanol extract, Pymetrozine and water plus methanol and then were placed in the glass cages. Thirty adult insects of the same age were released into the cages and after 72 hours the adult insects were removed and the eggs that their ages were less than 24 hours were kept and then the gender of adult insects that leaved the eggs exposed to infected plants was determined and the spawning rate of female insects was recorded daily until the end of the last day of their lives. The experiment was investigated in five replications in form of a completely randomized design, in the temperature conditions of $27\pm 2^{\circ}\text{C}$ and relative humidity of 50 ± 5 percent and light conditions including 16 hours of light and 8 hours of darkness. The stable population parameters were calculated according to Chi and Liu model (1985)[2]. The results showed that there is a significant difference between treatments at one percent level. The intrinsic rate of increase (r_m), for control, *T.polium* and pymetrozin were 0.01 ± 0.001 , 0.069 ± 0.002 and 0.031 ± 0.001 respectively, the finite rate of increase (λ) were 1.011 ± 0.01 , 1.07 ± 0.003 and 1.03 ± 0.002 , the gross reproduction rate (GRR) were 90.30 ± 4.30 , 31.40 ± 3.50 and 27.01 ± 2.76 respectively. Therefore, *T.polium* extract can be remarkable as an insecticide against *Bemisiatabaci* (Genn.).

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**YIELD POTENTIAL EVALUATION OF DIFFERENT CUMIN
ECOTYPES IN DIFFERENT WINTER SOWING DATES**

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Cumin (*Cuminum cyminum* L.) is an important seed spice, and known as one of most important drug plants in Iran. In order to study the effects of different sowing dates on yield potential of cumin ecotypes, this experiment was conducted based on RCBD design with split plot arrangement and 3 replication, in Kerman on growing season of 2011-2012. Five sowing dates (25th December, 9th and 24th January, 8th and 23rd February) as main factor, and nine cumin ecotypes (Semnan, Pars, Yazd, Golestan, Khorasan Razavi, Khorasan Shomali, Khorasan Jonoubi, Esfahan and Kerman) as sub factor, were applied. Effects of sowing dates were significant on plant height, number of branches, biological, seed and straw yield, harvest index and 1000-seed weight. All the characters were significant among the ecotypes, except number of umbel per plant. The interaction of sowing dates and ecotypes were significant on all the characters except number of umbels per umbel and 1000-seed weight ($P < 0.01$). Kerman ecotype in 5th date had maximum biological, seed and straw yield, with the averages 1641.94, 1067.45 and 621.02 Kg.ha⁻¹, respectively, and Yazd in 1st date, had minimum yield with averages 633.88, 337.68 and 256.52 Kg.ha⁻¹, respectively, in these characters. Semnan had maximum HI in 3rd date and minimum was in 1st date (with 68.52 and 56.06%, respectively). According to the obtained results and suggestion of previous research [1] and considering that most of yield loss in cumin have been reported due to fungal diseases [2], and late sowing dates (later than mid-January) reduced wilt incidence and minimized yield losses [3], therefore planting of Kerman ecotype in late of January and in February, can be recommended for cumin cultivation in south east of Iran.

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**ANTIBACTERIAL ACTIVITY OF *EREMURUS PERSICUS* BOISS.
LEAVES AND FLOWERS**

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Infectious diseases account for approximately one-half of all deaths in tropical countries. In industrialized nations, despite the progress made in the understanding of their microbiology and control, infection usually occurs due to drug resistant microorganisms. Historically, plants have provided a good source of anti-infective agents [1]. The genus *Eremurus* (Liliaceae) comprising of nearly 50 species, is mainly restricted to central and western Asia and six species are known to exist in Iran. *Eremurus persicus* locally called "Serish" is widely distributed in south, east and west of Iran [2]. The antimicrobial activity of leaves and flowers of the plant were detected against 12 microorganisms including 3 fungi and 9 bacteria using disc diffusion and minimal inhibitory concentration (MIC) test methods [3]. Methanol extract of the flowers showed weak effectiveness against *S. aureus* and *S. epidermidis* with inhibition zones of 9mm and 10mm and MIC values more than 1000 µg/ml, respectively. The leaves extract was also only weakly active against *p. vulgaris* with inhibition zone of 10 mm and MIC>1000 µg/ml.

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**EFFECT OF LEAVE KIND ON THE SECONDARY METABOLITS
CERTAIN IN OLIVE (*OLEA EUROPAEA L.*)**

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Olive leaves are rich source of bioactive phenolic compounds that reduce blood pressure and blood sugar [1, 2]. The purpose of this study was determined the effect of leaves kind on the secondary metabolits certain of Olive Croniky variety. The experiment was performed in completely randomized design with three replications .The Factors measured were included the fresh weight, dry weight, total phenolic content, total flavonoid content, Anthocyanin, carotenoid and chlorophyll. All factors were determined spectrophotometrically. The analysis of variance showed significant differences (at the 5% level) between the young and mature leaves of olive, in the total flavonoid content, carotenoid and chlorophyll but, there were not any significant difference between total phenolic content and anthocyanin. The result showed that the highest amount of flavonoid (4.52 mg QUE g⁻¹), carotenoid (4.43 mg FW g⁻¹) and chlorophyll were in mature leaves.

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**EXTRACTION AND IDENTIFICATION OF A NEW ESTER
COUMARIN FROM *FERULA ORIENTALIS* ROOTS**

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The *Ferulagenus* (Apiaceae) comprises 130 species, which are widespread central Asia and Mediterranean area. Several species were used in traditional foods as well as in folk medicine as treatment. *Ferula orientalis* is one of the *Ferula* species that had been studied on essential oils with antioxidant properties from this plant, in this investigation, first, powdered roots of the plant (150gr) were extracted with *n*-hexane, dichloromethane and methanol solvent respectively, using a soxhlet apparatus. Then-hexane extract were concentrated and fractioned with vacuum layer chromatography. The obtained fractions were tested using TLC. The 50-60% *n*-hexane fraction was candidate for preparative TLC. 95% chloroform: 5% acetone was used as solvent system in TLC. The TLC analyses were afforded brownish oil with R_f value of 0.4 and blue florescent. And the compound molecular weight was determined 534. At last the compound structure identified by NMR, IR and Mass spectroscopy methods, The Compound was named as 7-O-(4',8', 12', 16' tetra hydroxy-4', 8', 12',16' three methyl heptadecanoil)-coumarin. Because of the presence of this compound and similar coumarin compounds in this plant, the roots of plant might be exhibited biological effects such as antifungal and antibacterial effects.

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**THE EFFECT OF DIFFERENT LEVELS OF VERMICOMPOST ON
NUTRIENTS BALANCE OF *DRACOCEPHALUM MOLDAVICA*.**

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Dracocephalum moldavica is a medicinal plant which belongs to the Lamiaceae family with uses in cosmetics, food and perfumery[1]. To study the effect of different levels of vermicompost on nutrient uptake by *Dracocephalum moldavica* an experiment was carried out in a completely randomized design with 3 treatments in 3 replications. The first treatment included vermicompost 25% and soil 75%; the second treatment included vermicompost 50% and soil 50%. The last treatment (control) included soil 100%. Results of ANOVA showed that the highest concentrations of iron (Fe) and manganese (Mn) were recorded in the control, i.e., soil 100% and the highest concentrations of zinc (Zn), phosphorus (P) and potassium (K) were recorded in the treatment of soil 50% and vermicompost 50%. The lowest concentrations of these elements were recorded in the treatment with vermicompost 25% and soil 75%. In leaves, the highest concentrations of Fe, Mn and P were recorded in the treatment with soil 100% and the highest concentrations of zinc and potassium were observed in the soil bed with 50% vermicompost and 50% soil. In the bed soil with 25% vermicompost and 75%, the lowest concentrations of these elements were observed in leaves. While the highest concentrations of zinc, manganese, phosphorus and potassium in branches of the flowering plant were recorded in the soil bed with 50% vermicompost and 50% soil treatment, the highest concentrations of iron were recorded in the control soil bed, i.e., soil 100%. The general results of the study revealed that while the highest concentrations of the elements in overall plants (stem, leaf and flowering branch) were observed in the soil bed with 50% vermicompost and 50% soil, the lowest concentrations were observed in the treatment of vermicompost 25% percent and soil 75%.

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A NEW PH-RESPONSIVE POLYMER COATED MAGNETIC NANOPARTICLES FOR LOADING AND DELIVERY OF QUERCETIN

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Polyphenolic compounds play an important role as natural potent antioxidants, exhibiting various physiological and biological activities, such as anti-inflammatory, anti-allergic and anti-carcinogenic activities, in the human metabolic system [1]. Quercetin (QU) is a well-known flavonoid distributed ubiquitously in fruits, vegetables, and herbs or related products, e.g. apples, onions *Ginkgo biloba* and red wine, respectively [2-3]. QU has been extensively investigated for its pharmacological effects that include anti-tumor, anti-inflammatory, antioxidant and hepatoprotective activities. Clinical studies investigating different programs of administration of QU have been limited by its poor water solubility. In this study, we prepared poly (MAA-co-AA) grafted polyvinyl pyrrolidone coated 3-aminopropyl triethoxysilane modified magnetic nanoparticles. Magnetic nanoparticles were prepared by chemical co-precipitation of Fe^{2+} and Fe^{3+} with NH_4OH . The nanoparticles characterized by transmission electron microscopy (TEM) and Fourier transformation infrared spectroscopy (FT-IR). Loading and Delivery behavior of prepared nanoparticles was studied by selecting quercetin as a model drug and its determination was performed spectrophotometrically at 370 nm. The results revealed that quercetin-loaded modified nanoparticles released completely at pH=1.2 within 6 h but only a small part of quercetin (25%) was released at pH=5.5.

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**THE STUDY OF GENETIC PARAMETER RELATED OF SALINITY
TOLERANCE IN SOFFLOWER**

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Salinity is an important limiting factor in agriculture production. Safflower (*Carthamus tinctorius* L.) is a moderate salt tolerant crop. This experiment was carried out to study the genetic control of different agronomic traits. Generation mean analysis with five generation (P1, P2, F1, F2, and F3) was done from a cross between Mex.22-191 (tolerant genotype) × IL.111 (susceptible genotype). The field experiment design was carried out in saline environment based on Randomized Complete Block Design with two replication. Different agronomic traits was studied in this study including plant height, number of main branches per plant, number of capsules per plant, total dry weight per plant, number of grain per plant, seed yield, number of seeds per capsule and 1000- seed weight. Joint Scaling Test was used for generation mean analysis. The results showed that in major of the traits, dominance effect played an important role in genetic control of the traits. Traits such as plant height, number of capsules per plant, total dry weight per plant and 1000- seed weight were showed epistasis effects. Plant height showed most additive × additive effect and number of capsules per plant showed most dominant × dominant epistasis effect. Also heritability was between 0.41 and 0.97 for different traits that seed yield showed most heritability and number of main branches per plant showed lowest heritability. Finally it is detected breeding strategies for salt tolerance improvement of safflower can be done through combination of techniques such as going toward selection for the traits with additive and epistasis genetic control such as plant height and 1000- seed weight and also hybrid vigor production for the traits with dominant and epistasis genetic control such as number of capsules per plant and total dry weight per plant [1,2].

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**AMINO-SILANE MODIFIED MAGNETIC NANOPARTICLES FOR
LOADING AND DELIVERY OF CHLOROGENIC ACID**

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Chlorogenic acid (3-*O*-caffeoyl-D-quinic acid) is an ester formed between caffeic acid and quinic found in numerous plant species. Chlorogenic acid (CA) is the major bioactive constituent in the herb. From the point of view of health, some of these phenolic compounds, such CA is an important source of antioxidants and free radical scavengers [1]. This acid is considered as the preferential natural substrate for polyphenol oxidase and therefore it may have an effect on the oxidation process and color development during cider making [2]. In recent years, the integration of nanotechnology with biology and medicine has utilized functionalized nanoparticles in molecular biology, therapeutics and bio-separation [3]. Magnetic nanoparticles such as magnetite have been growing interest in various filed such as MRI, magnetically assisted drug delivery and separation [4].

In this study, we prepared amino-silane coated magnetic nanoparticles delivery system for controlled release of CA. Magnetic nanoparticles were prepared by co-precipitation of Fe²⁺ and Fe³⁺ with NH₄OH then functionalized with 3-aminopropyl triethoxysilane. The nanoparticles characterized by transmission electron microscopy (TEM) and Fourier transformation infrared spectroscopy (FT-IR). Delivery behavior of nanoparticles was studied by selecting CA as a model drug. Determinations were performed spectrophotometrically at 326 nm. CA-loaded nanoparticles released completely (within 6 h) at pH=7.2 but only a small part of ciprofloxacin (17%) was released at pH=5.5.

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STUDY OF CORRELATION BETWEEN YIELD AND YIELD COMPONENTS OF CUMIN UNDER DIFFERENT IRRIGATION INTERVALS TREATED WITH IRON CHELATE NANO FERTILIZER

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Cumin (*Cuminum cyminum*) is one of the important medicinal plants that grow in arid and semi-arid lands can be expanded. Since the main area of our country is affected by drought and low water, in order to optimize the use of water any research will be suitable. To study the effect of levels of Nano Iron chelate fertilizer on yield and yield components India, Isfahan and Kashmar of cultivars under different irrigation in 2011 growing season at the Research Farm Faculty of Agriculture, University, as split-plot factorial experiment according to randomized complete block design with three replication. Main plots were 7, 9 and 11 days irrigation intervals. India, Isfahan, Kashmar populations and iron chelate Nano fertilizer (Khazra) applied. With amount 3 and 6 kg/ha and the controls. Results showed a significant relationship between grain yield with the number of main umbrella per plant, number of seed per umbrella, thousand seed weight and biological yield were found. Given the positive relationship between yield and yield components and focus to enhance of these components is a way to obtain high performance. In this study, significant relationship wasn't found between the yield and number of subsidiary umbrella.



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**EVALUATION OF EFFECT ATTRACT MOISTURE SUBSTANCES
AND ORGANIC FERTILIZERS ON QUALITY AND QUANTITY YIELD
OF PURSLANE (*PORTULACA OLERACEA* L.) IN AHVAZ REGION**

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Medical plant Purslane, contain large amounts of material with extraordinary health benefits of Omega-3 fatty acids and monounsaturated fatty unique combination of vitamin C, beneficial effects on the circulatory system and the heart. Therefore, research into application attract moisture substance and organic fertilizer and chemical on yield of purslane (*portulaca oleracea* L.) In Khuzestan conditions, a filed experiment was conducted experimental field of Ramin Agriculture and Natural Resources University in Ahwaz, south-western of Iran, during 2011- 2012 growing season. Treatments were arranged as a split plat experiment in a randomized complete block design with four replications. The main plot involves Zeolites of 2 tons per hectare (z_1), super absorbent material at the rate of 200 kg hectare (z_2),_Control plots (z_3) (without application of attract moisture substance) and subplots involving fertilizer treatments at five system (cow manure system (S_1), Sheep manure system (S_2), chicken manure (S_3) Filter cake (S_4) chemical fertilizer (S_5) and Control plots (s_6) (Without the use of organic and chemical fertilizers). The results indicated that application chemical manures plant fresh and dry weight, stem fresh and dry weight, leaf fresh and dry weight, plant height and stem diameter was increased but_control plots and Filter cake had lowest fresh and dry weight, stem and leaf, stem diameter and had. Zeolites and super by increasing the amount of moisture available to plants had the most of the dry weight, stem and leaf, stem diameter. The overall results indicate the feasibility of using chemical fertilizers with attract moisture substance increase the yield of purslane.

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**GENE MAPPING OF QUANTHITATIVE TRAITE FOR SALINITY
TOLERANCE IN SAFFLOWER**

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Identification of responsive QTLs to salinity tolerance for some morphological traits in safflower (*Carthamus tinctorius* L.) was used F₂ population at research farm of Ekhtiyar abad during 2010-2011. Phenotypic evaluation of 100 lines of F₃ population that were originated from IL-111 (sensitive genotype) × Mex.22-191 (tolerant genotype) was carried out. The results of QTL mapping were identified by 66 single plants of F₂ using micro satellite markers including SSR and ISSR. Based on result totally 24 linkage group were found using kosambi mapping function with the total size of 646.2 CM over the genome and with average 4.45 of CM. The highest and lowest number of QTLs was found for dry weight and plant height, respectively. Inclusive composite interval mapping analysis revealed that in addition to chromosome 4 major QTLs controlling salinity tolerance were found on chromosomes 1, 3, 8 and 9. Major QTLs for plant height were located on chromosome numbers of 4 and 9. For number of capsules per plant, seed yield, plant dry weight and seed number per plant chromosome 1 contained the major QTLs. Chromosome 8 and 9 had major QTLs for 1000-seed weight. For seed number per capsule, chromosome 3 had a major QTL. The significant epistasis effects not found in this study. Based on the results, breeding methods for QTLs pyramiding using a marker-assisted selection method, could be very useful for development of new varieties with a high level of salt tolerance via targeting several major QTLs for salt-tolerance in M22-191[1-3].

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CHANGES IN THE AMOUNT OF ESSENTIAL OIL EUCALYPTUS SPECIES GROWN IN QOM AND BEHSHAHR, AND ITS RELATION TO MORPHOLOGICAL CHARACTERISTICS OF LEAVES

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Genus (*Eucalyptus sp*), from the Myrtaceae. The tree species has been entered to Iran over hundred years [1]. As respects environmental and genetic factors that lead to Incidence of different morphological traits are, the type and amount of secondary metabolites affect [2]. Therefore in this study eucalyptus essential oil yield of different species with different morphological characteristics were studied. The species *E. grandis*, *E. camandulensis*, *E. microtheca*, *E. rubida* were collected from the research station engineer BADIEE Qom and the research station Behshahr, at the end of June. The morphological comparisons, samples of leaves dried in the shade and at room temperature for two weeks, and after that they were milled. Then distillation with water was performed for hundred minutes. Analysis of data and graphs was calculated and plotted with software Minitab16 and SAS. Data analysis showed that the essential oil of the species studied significant at 1% in QOM and 5% in Behshahr. Also showed that the essential oil of the ecotype studied significant at 1%. Leaf number and leaf length in *E. grandis*, leaf length and leaf width in *E. camandulensis*, leaf number and leaf length in *E. microtheca*, leaf area and leaf width in *E. rubida*, had been the greatest impact on essential oil respectively. The climate is the important environmental factors affecting in secondary metabolites. Full sun and favorable conditions of temperature with fluctuating around 30°C in Qom, are gathered to make condition for essential oil accumulation in plants, especially on tree types.

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**STUDY OF ANTIMICROBIAL EFFECTS OF NARCISSUS JONQUILLA
ESSENCE ON COMMON GRAM POSITIVE AND NEGATIVE
BACTERIAS (*E.COLI* , *B.CEREUS*, *S.AUREUS*)**

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In the traditional Japanese medicine of kampo, wounds were treated with narcissus root and wheat flour paste; the plant, however, does not appear in the modern kampo herb list. The Roman physician Aulus Cornelius Celsus listed narcissus root in *De Medicina* among medical herbs, described as emollient, erodent, and "powerful to disperse whatever has collected in any part of the body". In one scientific study, the ethanol extract of the bulbs was found effective in one mouse model of nociception, para-benzoquinone induced abdominal constriction, but not in another, the hot plate test. Daffodils are grown commercially near Brecon in Powys, Wales, to produce galantamine, a drug used to combat Alzheimer's disease. All *Narcissus* species contain the alkaloid poison lycorine, mostly in the bulb but also in the leaves. On 1 May 2009 a number of schoolchildren fell ill at Gorseland Primary School in Martlesham Heath, Suffolk, England, after a daffodil bulb was added to soup during a cookery class. The bulbs could often be confused with onions, thereby leading to incidents of accidental poisoning. One of the most common dermatitis problems for florists, "daffodil itch" involves dryness, fissures, scaling, and erythema in the hands, often accompanied by subungual hyperkeratosis (thickening of the skin beneath the nails). It is blamed on exposure to calcium oxalate in the sap. It has long been recognized that some cultivars provoke dermatitis more readily than others. The cultivars 'Actaea' 'Camparelle', 'Gloriosa', 'Grande Monarque', 'Ornatus', 'Princeps' and 'Scilly White' are known to do

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**THE EFFECT OF DIFFERENT LEVELS ZEOLITE ON CAROTENOID
AND CHLOROPHYLL OF *CALENDULA OFFICINALIS* L.**

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Calendula officinalis, a member of compositae family, is well known for its pharmacological effects such as anti-inflammatory, antiviral, anti-HIV, antitumor, antimutagenic and cytotoxic properties [1]. The flowers contain a variety of compounds including flavonoids, phenolic acids, terpenoids, carotenoids and sterols [2]. In order to study The effect of different levels zeolite on carotenoid and chlorophyll of calendula (*Calendula officinalis* L.). an experiment conducted university, Saveh Branch in 2012, experiment was carried out as randomized complete design with three replication and four zeolite levels 0 (control), 11, 22 and 44 (gr.5kg⁻¹). Result of variance analysis showed that effect of zeolite had significant effect on carotenoid and chlorophyll, chlorophyll a,b (p ≤ 0.05). The result showed that the highest rate of carotenoid, total chlorophyll, chlorophyll a,b was obtained from 44 (gr.5kg⁻¹) treatment with 0.97, 22 (gr.5kg⁻¹) treatment with 0.98, 22 (gr.5kg⁻¹) treatment with 0.12, 22 (gr.5kg⁻¹) treatment with 0.50 respectively.

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**THE EFFECT OF LETTUCE HYDRO ALCOHOLIC EXTRACT ON
SOME BLOOD PARAMETERS IN MICE**

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Lettuce (*Lactuca sativa*) has a variety of health effects, including relief of organizers, sleeping, soothing, and cathartic [1]. In this study, the effect of intraperitoneal injection of hydro alcoholic extract of lettuce on some blood parameters in male mice was studied. Five groups each including ten adult male (Balb/C) mice weighing 30±5g were chosen. Normal saline was administered for placebo group and lettuce hydro alcoholic extract in doses of 50,100,200 mg/kg was injected intraperitoneally for 20 days in experimental groups[2]. After the last injection blood samples were taken from all groups, and then cholesterol, triglycerides, HDL, LDL were examined. Data results in a significant level of P <0.05 were studied. The results of this study showed that hydro-alcoholic extract of lettuce caused a significant reduction in HDL in a dose 200mg/kg and a significant reduction in cholesterol in a dose 50 mg/kg but no changed significantly with triglycerides and LDL in the experimental groups with control group. The results can be stated that lettuce extract has a significant dose dependent effect on the some blood parameters in mice.

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**DESIGNING OF HERBAL BASED INHIBITORY BIOACTIVE
MOLECULES FOR VEGFR IN ANGIOGENESIS**

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The emergence of metallo- β -lactamase (MBL) in gram negative bacilli (GNB) is becoming a therapeutic challenge worldwide. Detection of MBL is also a challenge for routine microbiology laboratories, since there are no standardized methods for MBL detection. The aims of this study were to know prevalence of MBL production in various gram negative bacilli, to evaluate different phenotypic methods to detect MBL production and to find out antibiotic sensitivity profile of MBL producing gram negative bacilli. Material and methods: Total 450 clinical isolates of GNB including *E. coli*, *Pseudomonas*, *Klebsiella*, *Acinetobacter* and Other GNB were subjected to antibiotic susceptibility testing. Imipenem, ertapenam, meropenam and third generation cephalosporins resistant clinical isolates were taken as positive for MBL screening. Four different methods using EDTA as MBL inhibitor were evaluated: (i) Combined disk synergy test with imipenem (CDST-IPM), (ii) Double-disk synergy test with imipenem (DDST-IPM), (iii) CDST with ceftazidime (CDST-CAZ) and (iv) DDST with ceftazidime (DDSTCAZ). Result: Out of 450 clinical isolates of GNB, 27 isolates (6.00%) were resistant to imipenem, ertapenam, meropenam and third generation cephalosporins. These 27 isolates were considered screening positive and further tested for MBL production by four different methods.

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**THE EFFECT OF HARVEST TIME AND DENSITY ON ESSENCE
YIELD OF BIENNIAL TARRAGON (*ARTEMISIA DRACUNCULUS L.*)**

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Tarragon (*Artemisia dracunculus L.*) is one of the valuable medicinal plants that its cultivation is common in Iran and so far, there is not too much research about it. In traditional folk medicine, tarragon has been used for digestive problems and externally for joint pain. It is a versatile herb that appears to contain preventative substances for cancer and possibly some viruses. Tarragon is also used as a commercial flavoring and in perfumery. In order to evaluate the effects of harvest time and density on essence yield of tarragon, a research was conducted in experimental farm of Agriculture and Natural Resources in Research Center of Kerman on two years old plants in a randomized complete block design with four replications. Density and harvest time were applied in four levels (8000, 11000, 16000 and 33000 plants per hectare) and three period (June, August and October), respectively. Agronomic traits such as plant height, canopy cover, dry matter yield per plant and plant essences noted and analysis was performed with statistical software SPSS and Duncan's test was used to group attributes. Results showed that effect of density and harvest time on essence yield was significant at the one percent probability period; so that the highest essence yield was obtained at the density of 8000 plants per hectare and harvest time in June. The best harvest time to achieve the highest essence content, dry matter yield, plant height and canopy were in June. Also, the optimum density of 8000 plants per hectare was evaluated as the best density.

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STUDY EFFECT OF ORGANIC, INORGANIC FERTILIZERS AND CUTTING ON AGRONOMIC CHARACTERISTICS IN COMMON PURSLANE(*PORTULACAOLERACEA* L.)

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Common purslane (*portulacaoleracea* L.) is known in as one antihypertensive and antidiabetic in many countries. This plant contains many compounds, including free oxalic acids, alkaloids, omega-3 fatty acids, coumarins and flavonoids. A field experiment was conducted in 2012 in order to study effect of Organic, Inorganic Fertilizers and cutting on agronomic characteristics in common purslane (*portulacaoleracea* L.), The experimental design was a split plot in time with three replications. Fertilizer treatments at five system cow manure system (S1), Sheep manure system (S2), chicken manure (S3) Filter cake (S4) chemical fertilizer (S5) and Control plots (s6) (Without the use of organic and chemical fertilizers and cutting was main plot and sub plot respectively. The results of the experiment revealed that fresh weight of plant and fresh weight of stem were higher in first harvest and percentage of fresh weight of plant produced in the first, second and third harvests were 46.7, 31.6 and 21.7 respectively. Among fertility systems, chemical fertility and chicken manure were obtained highest fresh weight, respectively. Chemical fertilizer with 2117/77 gr in each square fresh weight produced the highest yield and filter cake with 765.12 gr in each square fresh weight produced the lowest yield. Our results suggested that yields were increased, by application of chicken manure around from application chemical fertilizer was benefit to the environment because with decrease use of chemical fertilizer and use of inputs organic can move to sustainable agriculture.

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**INFLUENCE OF CALCIUM NITRATE ON THE CHANGE OF
MORPHOLOGICAL CHARACTERISTICS AND MUCILAGE CONTENT
OF BORAGE**

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Borage (*Borago officinalis* L.) is an herbaceous annual plant which contains high percentages of gamma linolenic acid in the seed oil. The aerial part of borage contains mucilage and the other secondary metabolites [1,2]. Calcium one of the essential nutrients for plants, has been observed to play a major role in the initiation of many signal transduction processes in higher plant cells, polar growth, movements and hormone regulated growth and development [3]. The main aim of the study was to determine the effect of calcium nitrate on morphological traits, mucilage content and swelling index on borage. The experiment was performed in a completely randomized block design with three replicates. The treatments were three concentrations of calcium nitrate (5, 10, 15 mM) and control which sprayed on aerial parts of plant at onset of flowering and seed set stages.

The results showed that various concentrations of calcium nitrate had a significant effect ($p < 0.05$) on calcium concentration in the plant tissues. The highest amount of calcium in plant tissues was observed at the calcium nitrate 15 mM. The plant height ($p < 0.01$), leaf number, total Ash, seed yield, mucilage percentage and swelling index values, in the aerial parts of the plants were significantly ($p < 0.05$) affected by the application of different concentrations of calcium nitrate, but had no significant effect on the insoluble acid ash content, leaf width and leaf length. The highest plant height, leaf number, total ash and seed yield were observed when 15 mM of calcium nitrate was applied, whereas the highest mucilage percentage and swelling index values were observed with 5 mM of calcium nitrate. A 15 mM concentration of calcium nitrate had a stronger beneficial effect than the other treatments with respect to the majority of the measured properties of borage.

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**EFFECTS OF DROUGHT STRESS INDUCED BY POLYETHYLENE
GLYCOL ON GERMINATION AND MORPHOPHYSIOLOGICAL
CHARACTERISTICS OF *DRACOCEPHALUM MOLDAVICA***

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Dracocephalum moldavica is a medicinal plant which belongs to the Lamiaceae family with uses in cosmetics, food and perfumery [1,2]. In order to study the effect of drought stress due to poly ethylene Glycol on germination and vegetative growth of *Dracocephalum moldavica* an experiment was conducted in a complete random block design with three replications. Four levels of drought stress in the experiment included 0 (control), -0.4, -0.8 and -1.2 bar that were obtained by polyethylene glycol 6000. The results showed that drought stress had meaningful effect on germination characteristics including germination percentage, germination rate, seed vigor index, plumule length and plantlet wet weight ($p \leq 0.01$). Comparison of the means in treatments showed that with an increase in drought stress, all parameters under study decreased. Drought stress did not affect germination index, radical length, dry weight and proline content ($p \leq 0.05$).

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**STUDY OF THE CHEMICAL CHARACTERISTICS
OF SOME POMEGRANATE CULTIVARS IN MAZANDARAN AND
KHORASAN**

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Pomegranate (*Punicagranatum*L.) belongs to the Punicacea family. Different parts of its tree have been used traditionally for their medicinal properties and good potency for cancer prevention. The edible part of the fruit contains considerable amounts of acids, sugars, vitamins. pomegranate juice is enriched in anti-atherosclerotic and anti-atherogenic compounds which have been shown to reduce blood pressure and low density lipoprotein (LDL) oxidation. These activities have been attributed to its phenolic fraction containing a significantly high level of hydrolyzable tannins, as well as anthocyanins which exhibit high antioxidant activity. [1,2]. This research investigated to evaluate the vitamin C, the content of anthocyanins in juice and skin in three varieties native to south Khorasan (Ghand, Shahvar, Shalghami) and Mazandaran (Shekar, Shirin, Sangak). The experiment was conducted in completely randomized design with two replications. The analysis of variance showed that there were highly significant differences (at the 1% level) among the cultivars in the skin and juice anthocyanin content, vitamin C. The result showed that the highest rates of skin and juice anthocyanins content and vitamin C were in the Shalghami varieties that were respectively of 0.753 µg per g, 0.743 µg per g, 4.51 mg juice. The lowest rates of juice anthocyanins content was 0.086 µg per g which corresponds to cultivar Ghand. Cultivar Sangak has the least amount of skin anthocyanins and vitamin C that were respectively 0.038 µg per g and 1.78 mg juice.

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**THE EFFECT OF OPTIMUM PLANTING DATE AND HARVEST
STAGE ON ESSENTIAL OIL OF SATUREJAHORTENSIS IN SAVEH**

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Summer Savory as a medicinal plant comeingunder the scientific name of *Saturejahortensis*L. is a plant which comes under the family of Lamiaceae. Carvacrol is one of the most important chemical compounds of its essential oil. In order to determine the best optimum time of planting date and harvest stage effecting Carvacrol functional and essential indeces a testin the form of random complete block design with three replications in crops year 90-91 was carried outin Savehat the Islamic Azad University in research farm. In this plan the first treatment was carried out by planting in 3 different dates which are on Ordibehesht 15, Ordibehesh 25 and Khordad 5 respectively and the second treatment was by harvesting before flowering, in full blooming stage and at the beginning of fruit set.Different parts of *Saturejahortensis* were harvested an immediately were weighed with a scale of 0/01 accuracy and recorded. And then the parts were dried in shade. Then the essential oil of dried samples was distilled through Clevenger method and them their chemical compounds were identified by gas chromatography (GC).Foundingshave shown that planting date hassignificantly influence the weight of fresh leaves, fresh flowers, fresh stems and also the percentage of Carvacrol up to 1%. Andharvest stage has significantly influence the weight of fresh leaves and percentage of Carvacrol up to 1%. The highest weight of fresh leaves and also percentage of Carvacrol were obtained during plantation dated Khordad 5 however the highest weight of fresh flowers, fresh stems were obtained during plantation dated ordibehesh 15.Moreover the highest weight of fresh leaves, fresh flowers,freshstems and percentage of Carvacrolwere obtained at the beginning of fruit set.Therefore it is concluded that plantation dated Khordad 5 and the harvest at the beginning of fruit set have made the highest weight of fresh leaves, fresh flowers and percentage of Carvacrol be obtained and plantation dated Ordibehesht 15 and harvest at the beginning of fruit set have made the highest weight fresh stems be obtained.

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**THE EFFECTS OF BORIC ACID AND SEED OSMOPRIMING ON
GERMINATION AND EARLY SEEDLING GROWTH OF
*PETROSELINUM CRISPUM***

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In production of medical plants, seed germination is a very important problem. Seed priming consists of imbibing seed in an osmotic solution that allows pre germination metabolism to proceed, but prevents radical emergence [1]. The aim of this experience was to investigate the effects of seed priming on germination of *Petroselinum crispum*. This medical plant Experience done in 4 hour (12, 16, 20 and 24) and 3 repetition for 5 treatment included 1-Boric acid (B_3O_3) 0.1%, 2-Boric acid 0.1%, Fructose 0.25%, 3- Boric acid 0.1%, Fructose 0.5%, 4- Boric acid 0.1%, Fructose 1%, 5- Boric acid 0.1%, Glucose 0.25% and distilled water as control treatment. Experience was significantly on germination percentage and resulted Boric acid 0.1% and Fructose 0.25% at 24h reduced the time of germination to about 94% in 6hours that this reduction was amazing.

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ANTIOXIDANT ACTIVITY OF SOME EXTRACTS FROM AERIAL PARTS OF *AJUGA CHAMAECISTUS* SSP. *TOMENTELLA*

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The genus *Ajuga*, belongs to Lamiaceae family, is one of the exclusive subspecies in the flora of Iran. The plants of this genus are used traditionally for treatment of joints pain, gout and jaundice [1, 2]. The aim of this study was to evaluate possible antioxidant activity of methanol 70% extract and partition fractions of hexane, diethyl ether, and *n*-butanol fractions obtained from total methanolic extract obtained from aerial parts of *Ajuga chamaecistus* ssp. *tomentella*. Ferric reducing antioxidant power (FRAP) assay, and 2, 2-diphenyl-1-picrylhydrazyl (DPPH), scavenging potential, were used to study antioxidant activity. The methanol extract was found to have the highest radical scavenging activity and antioxidant power as IC₅₀ 13.63 mg/ml, and 96.95 mmol Fe II per 100 gram dried plant, respectively. It can be concluded that, methanol extract of this plant could be considered as a potential source of natural antioxidants.

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**EVALUATION OF SILVER NANOPARTICLES INFLUENCE ON
ABSCISSION AND OIL CONTENT OF SEED BORAGE**

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Gamma-linolenic acid (GLA) has been reported to be helpful in the treatment of a wide range of disorders. The borage seed is important because it contains large amounts of oils and crude proteins, which make the borage a rich plant source of GLA (borage seed contains 20 to 30% oil) [1]. Although the average production of borage seed was recently estimated to be 400 kg per hectare, only approximately 80 kg of borage seeds may have been harvested due to high flower and seed abscission. A recent study showed that silver nanoparticles and silver nitrate can be used to increase the seed yield of borage by decreasing the extent of seed abscission [2].

This study was aimed to evaluate the effect of silver nanoparticles on yield and oil content of seed borage. The experiment was carried out in a completely randomized block design with three replicates. The treatments were three concentrations of silver nanoparticles (20, 40, 60 ppm) and control which sprayed on aerial parts of plant at onset of flowering and seed set stages. The results showed that concentration of silver ions within the plant tissues were significantly affected by using of silver nanoparticles, the highest silver concentration in tissues observed in the silver nanoparticle 60 ppm. It was found that different concentration of silver nanoparticles had a significant effect on seed abscission index, flower abscission, weight of hundred seed and seed yield, while, they had no effect on the seed oil percentage and fatty acids profile. Silver nanoparticles caused reduction of seed and flower abscission and the lowest value of them observed at 60 ppm. Therefore, seed yield increased with decline abscission of seed and the highest seed yield obtained with 60 ppm silver nanoparticles. Seed weight decreased with seed yield increasing and control has the highest weight of hundred seed. GLA percentage in various treatments was identical (19 %).

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EFFECT OF PRIMING WITH POLYETHYLENE GLYCOL AND NaCl
SALINITY ON GERMINATION HERB PURSLANE (*PORTULACAOLERACEA*
L.)

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Purslane (*Portulacaoleracea* L.) is an annual salt-tolerant species, which could be considered as vegetable fodder or medicinal plant in saline conditions. Since most sensitive to salinity at germination, in order to study the effects of priming with Polyethylene Glycol different levels of salinity germination characteristics of herb purslane. The experiment was conducted at the Seed Lab University in Ramin Ahwaz, experimental factorial arrangement based on Completely Randomized Design with 3 replication during in 2012. Treatments one involve priming with Polyethylene Glycol in three levels (no prime, prime for 4 hours and prime for 8 hours), treatments two involve five levels of salinity of NaCl 0, 5, 10, 15, 20 mmol/L. The results showed that salinity up to 15 mmol/L did not impose any significant difference in priming with Polyethylene Glycol germination characteristics on three levels but at 20 mmol/L salinity all the germination characteristics decreased significantly. The results indicated that purslane (*Portulacaoleracea* L.) could significantly tolerate saline conditions and can be considered as a medicinal plant in saline soils and arid regions. Also Polyethylene glycol material is not suitable for priming.

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**EFFECT OF ALTITUDE ON SOME OF THE SECONDARY
METABOLITS OF NETTLE IN GOLESTAN AND MAZANDARAN
CONDITIONS**

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Nettle (*Urticadioica*) is a medicinal plant from family of Urticaceae that cause low blood sugar, Reduce inflammation in rheumatoid, treatment of Bladder and urinary tract infections, Prostate and Acne [1,2]. To evaluate the effect of altitude on some of the secondary metabolites, an experiment was performed in Golestan and Mazandaran. The experiment was based on a completely randomized block with factorial design in 3 replications. Altitudes (50, 750, 700, 1450, 1350, and 2250) were used as treatments. In laboratory the phenol and flavonoid contents were measured using standard methods. Analysis of variance of data showed that, the contents of both phenol and flavonoid were significantly influenced by altitude. The highest phenol content (6/08 mg/g) and Flavonoid (17/015 mg/g) were observed in altitude of 2150-2250.

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EVALUATION OF HAIRY ROOTS PRODUCTION IN CONEFLOWER
(*ECHINACEA ANGUSTIFOLIA*) BY USING
AGROBACTERIUM RHIZOGENESIS STRAINS AR15834, MSU AND 1724

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Coneflower is an herbaceous medicinal plant that contains some valuable secondary metabolite such as cichoric acid and caffeic acid [1]. The hairy root culture is an important system for producing these metabolites in the medicinal plants. In this research, the effects of some strains of *Agrobacterium rhizogenes* including AR15834, MSU and 1724, were investigated for hairy roots production in *Echinacea angustifolia*. The leaves with petioles, provided from 40 and 60 days seedlings were cultured in the induction medium (solid MS with vitamins B5) and after 24h inoculated with the strains of bacteria and then incubated for 72 hours at 26 °C. Then the explants were transferred to the selective medium containing cefotaxime to eliminate the bacteria. The primary roots were observed after three weeks. Explants provided from 40 days seedlings were the suitable explants for hairy root production. Strain AR15834 was also determined as the best strain for inducing transgenic hairy roots in *Echinacea angustifolia*.

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EFFECT OF SOWING DATE AND PATTERN ON GROWTH PHYSIOLOGICAL PARAMETERS OF PURSLANE (*PORTULACA OLERACEA*) UNDER AHVAZ CLIMATIC CONDITIONS.

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Growth analysis to interpret how species respond to environmental conditions is very important and are frequently used in agricultural sciences. In order to study effect of sowing date and pattern on growth physiological parameters of *Portulaca oleracea* split plot experiment in randomized complete block design with four replication in 1390 at the Herb Garden Collection Ramin Agriculture and Natural Resources University Ahvaz done. Sowing date treatments consisted of three levels of D1, D2 and D3 (90/1/5-90/1/20 and 90/2/5 respectively) as the main plot and planting pattern (distance between rows) on the four levels hand besprinkle (P1), lines row (20 cm row spacing=P2), lines row (40 cm row spacing=P3) and lines row (60 cm row spacing=P4) planted as sub plot were taken. Harvesting was carried out in three times. Some of the traits associated with plant growth, total plant dry weight (TDW), leaf area index (LAI), leaf area duration (LAD), crop growth rate (CGR), relative growth rate (RGR) and leaf area ratio (LAR) were evaluated. The results showed that the effect of sowing dates on growth, physiological parameters had significant difference ($p < 0.05$). The highest increase in growth physiological parameters in first, second and third harvest observed in third, second and first sowing date respectively. Planting pattern P2 showed superiority to other planting patterns significantly. All interactions between sowing date and planting pattern had significant difference ($p < 0.05$). As in the first and second harvest, the most increasing showed in third sowing date and second planting pattern. but in third harvest, the first sowing dates and second planting patterns showed the most effect on growth physiological parameters.

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STUDY ON THE TISSUE DAMAGE OF ORAL ADMINISTRATION OF DIFFERENT DOSES OF *ZATARIA MULTIFLORA* ESSENTIAL OIL IN PERSIAN STURGEON (*ACIPENSER PERSICUS*)

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Adverse effects of drugs and chemical disinfectants which leads to resistance in body of farmed aquatics, makes it necessary to be replaced with herbal therapeutics having natural resources and it is one of the most important priorities of researchers in fish medicine arena. *Zataria multiflora* belongs to Labiate family, is one of the most well-known herbal drugs in Iran and traditional medicine. Its antimicrobial effects approved in different studies. Therapeutic parts of this plant include its top branches and dried leaves. Up to know, several studies performed on using *Zataria multiflora* on aquatics in Iran. These studies are on usage of herbal essence in controlling fungal pollutions on trout eggs [1] and the effects of *Zataria multiflora* essential oil on hatching rate of eggs in rainbow trout and survival rate of larvae in oxygenated water and malachite green [2]. Regarding the importance of sturgeons, this study carried out to determine the effects of different doses of oral administration of *Zataria multiflora* essential oil on tissue damage in Persian sturgeon (*Acipenser persicus*). In order to does this study, 150 Persian sturgeons having 75g mean weight transferred to tanks with 500L volume. After dividing the fishes into two groups (experimental and control group), the fingerlings fed by concentrate food which contains different levels of *Zataria multiflora* essential oil (15, 25, 50, 100g/kg) for 8 weeks. Finally, sampling carried out on the tissue samples from the liver, kidney and gill of fishes. After preparing the samples based on standard methods, pathology studies, performed. The results of tissue sections prepared in this study showed when dose of *Zataria multiflora* essential oil increases in treated fish food, the appearance of microscopic lesions will be wider in treatment group. According to the results of microscopic studies, lesions were observed in Gills prepared from Persian sturgeon include hyperemia, hyperplasia and hypertrophy and necrosis in secondary fields. Also examined the tissue sections prepared from fish liver complications such as hyperemia, cellular atrophy, fatty degeneration and necrosis of liver cells were observed.

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**EFFECT OF HORMONS AND EXPLANT IN CALLUS INDUCTION
AND SHOOT ORGANOGENESIS IN TISSUE CULTURE OF
*ECHINACEA PURPUREA***

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Echinacea purpurea L. is a group of purple coneflowers in the family Asteraceae. *Echinacea purpurea* has been used extensively in medicinal preparations for the treatments of colds and as an immunostimulant and anti-inflammatory remedy. Callus development and root organogenesis were observed on leaf and petiol explants cultured on media containing TDZ, KIN, BAP, NAA, IBA. The regenerants developed from induced callus were of two general types: compact somatic embryos, and elongated shoots. Addition of TDZ to the culture medium as growth regulator resulted in the production of big callus cultures. The cultures induced with TDZ and KIN developed only callus regardless of the concentration. No signs of shoot organogenesis were observed in callus cultures developed in the presence of TDZ and KIN. shoot organogenesis were observed with BAP concentrations. Higher rates of shoot organogenesis were observed with 2 mg/l BAP and 0.1 mg/l NAA.



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ANTIAGING EFFECTS OF *GLYCYRRHIZA GLABRA*, *HYPERICUM PERFORATUM*, *SILYBUM MARIANUM* AND MIXTURE OF THEM ON D-GALACTOSE INDUCED AGING IN MALE MICE

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Medicinal plants are recognized as sources of natural antioxidants that can protect from biological system oxidative stress that is involved in aging. In the current study, we evaluated the effects of three herbal drugs including *Glycyrrhizaglabra*, *Hypericumperforatum* and *Silybummarianum* in D-Galactose-induced aging model. First of all male BALB/c mice were treated by D-galactose(500 mg/kg) to become biochemically and pathologically aged. After 2 weeks, animals were randomly divided into 7 groups as follows: positive control (D-galactose 500 mg/kg for 6 weeks + Vitamin E 200 mg/kg/day, intraperitoneally for 4 weeks; herbal drugs treatment including 4 groups that received 500 mg/kg D-galactose per 1 ml drinking water plus *Glycyrrhizaglabra* (160 mg/kg/day); *Hypericumperforatum* (300 mg/kg/day) and *Silybummarianum* (50 mg/kg/), mixture group (*Glycyrrhizaglabra*, 35% of 160 mg/kg/day, *Hypericumperforatum* 35% of 300 mg/kg/day, and *Silybummarianum* 35% of 50 mg/kg, respectively by gavage for 4 weeks). The 7th group was sham and not given D-galactose. At the end of treatment, pro-inflammatory markers including tumor necrosis factor- α (TNF- α), interleukine-1 β (IL- β), interleukine-6 (IL-6), NF-kappaB (NF-kb), total antioxidant power (TAP), lipid peroxides (LPO) and male sex hormones i.e. testosterone and dehydroepiandrosterone-sulfate (DHEA-S) were measured in the blood. Results showed that D-Galactose induces a significant oxidative stress and proinflammatory cascade of aging while all herbs and the mixtures can restore all the changes in some parts. Interestingly, mixture of 3 plants showed the best effect in improving antioxidant, anti-inflammatory and male sex hormones in aged mice. The conclusion is that the combination of these herbs has a marked anti-aging effect on D-galactose-induced model of aging with synergic effects.



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**ASSESSMENT OF SOME BIOCHEMICAL PARAMETERS IN TWO
ROSA DAMASCENE MILL GENOTYPES IN DRY COLD WEATHER
CONDITIONS (CASE STUDY OF SEMNAN CITY)**

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In this study, two Rosa Damascene Mill genotypes were collected from Isfahan and South Khorasan Provinces and were cultivated in Natural Resources Research Station of Semnan City to verify some important biochemical traits. The evaluated traits include chlorophyll a, b & total, carotenoids, leaf and flower anthocyanins, proteins and minerals such as sodium, potassium and phosphorus. Spectrophotometric, Flamephotometric and centrifuge were used to measure the traits. The review of the results showed that the highest amount of chlorophyll, carotenoids, leaf anthocyanin and proteins belonged to Isfahan genotype. However, regarding flower anthocyanin, Khorasan genotypes were more than Isfahan. Regarding the mentioned minerals, there was no significant difference between the above genotypes [1, 2].

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COMPARISON OF ANTIOXIDANT PROPERTIES *MENTHA LONGIFOLIA* L. HUDSON VAR. *CHLORODICTYA* RECH .F. IN SABZEVAR AND GORGAN

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There are many antioxidants compounds in medicinal plants that increase the antioxidant activity [3] and they play an important role in free radical scavenging. There are free radicals in more than one hundred disorders in humans such as Atherosclerosis, arthritis, localized anemia, injection injury, gastritis, cancer and AIDS. It can deplete immune system antioxidant and change gene expression and stimulates abnormal protein during environmental pollution, radiation, chemicals, poisons, physical stress [2]. *Mentha* extracts have antioxidant properties [5]. The present study was designed to explore antioxidant properties *M. longifolia* L. in two regions of Sabzevar and Gorgan. In this study, 750 µl of ethanol extract of fresh leaves of *M. longifolia* L. combined with 250 µl of 2, 2-diphenyl-1-picrylhydrazyl (DPPH) in two regions. This solution was in the dark for 30 minutes then optical absorbance was read at 517 nm in a spectrophotometer. Ascorbic acid was test standard that they were prepared in the different concentrations then optical absorbance was read at 517 nm in a spectrophotometer [1]. (t-test) was used to evaluate the relationship between the amount of antioxidants in plants of Sabzevar and Gorgan with plant type. The antioxidant activity of Sabzevar *M. longifolia* L. was more than Gorgan *M. longifolia* L. Antioxidants are useful for diseases treating through the free radical scavenging [4]. Whatever the antioxidant compounds concentration increases, free radical scavenging power increases also. The results showed that Sabzevar *M. longifolia* L. has more antioxidant activity.

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EFFECT OF GROWTH REGULATORS, EXPLANTS SOURCE AND LIGHT/ DARK CONDITION ON *IN VITRO* CALLUS GROWTH OF *ARTEMISIA VULGARIS*

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Artemisia vulgaris L. (mugwort) belongs to the family Asteraceae and is a tall aromatic perennial herb, which grows throughout the hilly district of India in areas up to 2,400 m elevation. In traditional medicine, this plant is being widely used for the treatment of diabetes and the extracts of the whole plant is used for epilepsy and in combination for psychoneurosis, depression, irritability, insomnia and anxiety stress [1]. The effect of 2,4-D (0, 0.5 and 1 mg/L) and Kin (0, 0.1 and 1 mg/L) was investigated on callus induction in leaf, petiol and root explants of *A. vulgaris* in dark and light conditions. In dark and light conditions the highest fresh weight was obtained in root explants in 1 mg/L 2, 4-D. The dark and light treatments did not show significant differences. In the dark, the formed calli from leaf and petiol explants were hard and compact and in creamy and brown colors. The formed calli from roots were friable and light brown in colour. In the light, the calli were hard and compact and green in colour and the calli obtained from petiols and roots were light brown.

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**APPLICABILITY OF FLAVONOID SPOT PROFILES IN TAXONOMIC
CIRCUMSCRIPTION OF *Fritillaria* L. SPECIES IN IRAN**

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Genus *Fritillaria* L. in Iran comprises of 18 medicinal and/or ornamental plant species. Iranian species of this genus are traditionally classified in four subgenera and the taxonomy of the genus has been controversial. *F. ariana*, *F. bucharica* and *F. gibbosa* were transferred by some taxonomists to a new established genus (*Rhinopetalum*) and new taxa are introduced within existing subgenera. *F. crassifolia* subsp. *kurdica* has been promoted as *F. kurdica* and later was rejected. *Fritillaria poluninii* was also another controversial taxon which was promoted from *F. crassifolia* subsp. *poluninii* and later was rejected. *F. crassifolia* is an interesting and morphologically variable species growing in NW Iran. *F. grossheimiana* was established by Los- Losinsk. From specimens collected from Tabriz (NW Iran) and later was rejected and identified as *F. crassifolia* subsp. *kurdica*. Circumscription of the species using morphological characters is flawed and more precise sources of characters are needed. Molecular phylogeny of the genus is not fully studied and the current data do not encompass the important intra-specific variations.

This study was aimed to evaluate the applicability of flavonoids spot profiles in taxonomic circumscription of *Fritillaria* L. species in Iran. Sixty two samples from eight species of the genus *Fritillaria* collected from natural plant populations across Zagros Mountains chain of Iran are studied. Results based on flavonoids spot profiles revealed the patterns of inter- and intra-specific variations. Flavonoids spot profiles were both able to separate species and show intra-specific variations, confirming the applicability of flavonoids for chemotaxonomy of the genus. Qualitative data (0/1) are analysed using multivariate techniques and detailed results are presented as clustering and ordination graphs.



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LICHENS: A NEGLECTED FIELD RESEARCH AND THEIR MEDICAL POTENTIAL IN IRAN

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Lichen is intimate and long-term stable symbiotic association between a fungus and algae and/or cyanobacteria. The study of medicinal and biotechnological aspects of lichens remains quite neglected throughout the world, though they are dominant organisms of the terrestrial habitats and covering 8% of the vegetation over the Earth's land surface, particularly at higher elevations [1]. Traditionally, the most common use of lichens is recognized as bioindicator of air quality [7], however they are lately also concerned potentially with effective medicinal values for many human ailments. This is based on the fact that they are unique organisms, producing biologically active secondary metabolites with a great variety of effects, including antibiotic, antimycotic, antiviral, anti-inflammatory, antimycobacterial, analgesic, antipyretic, antiproliferative and cytotoxic effects [4, 6]. The antioxidant, antimicrobial and antimycobacterial activity [2,5], insecticide effects [1], antithrombotic activity [3] of some lichens extracts has been proved. According to the latest lichen checklist of Iran [8] about 750 taxa were reported from Iran. The aim of the study was to carry out a special checklist of Iranian medicinal lichens and investigate their taxonomic and chemical aspects and to introduce them to the Iranian Pharmacological Society and biotechnological researchers in order to use them as local potential for medical researches. Based on the long-term filed study during 1999- 2012 and literatuers, evaluation of several medinal lichen species have been recognized with medicinal potential in Iran. In this study three worldwide well recognized but neglected medicinal lichens were introduced from Iran for the first time. i.e. *Circinaria rostamii* Sohrabi (manna lichen), *Lobaria pulmonaria* (L.) Hoffm. and *Usnea longissima* Ach. A description of each taxa was made, including comments about the secondary metabolites, substrate, and habitats and distribution of the species in Iran and worldwide. A checklist of Iranian medicinal lichens was provided for the first time and will be published as online list in the MYCO-LICH website (www.myco-lich.com).

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OPTIMALIZATION SUSPENSION CULTURE OF MEDICINAL PLANT
ARTEMISIA DERACUNCULUS

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Artemisinin, isolated from the shrub-*Artemisia annua*, is a sesquiterpene lactone used to treat multi-drug resistant strains of falciparum malaria. It is also effective against a wide variety of cancers such as leukemia and colon cancer. To counter the present low content in leaves and uneconomical chemical synthesis, alternate ways to produce artemisinin have been sought. But this compound remains elusive in cell cultures of *A. annua* despite the extensive studies undertaken. This work reports the first successful approach for production of artemisinin by cell cultures of Indian variety of *A. annua* (1). Plant cell cultures have recently received much attention as a useful technology for the production of valuable secondary metabolites. Cell cultures are used in studying the biochemical pathway of certain plants to increase the industrial production of secondary metabolites (2). The effect of NAA (0, 0.1, 0.5, 1 and 2 mg/L) and BAP (0, 0.5, 1, 2 and 3 mg/L) on callus and cell suspension culture in *A. deracunculus* leaf explants. Results showed that in 0.5 mg/L BAP + 2mg/L NAA, 0.5 mg/L BAP + 0.1 mg/L NAA, 1 and 2 mg/L NAA soft calli were obtained and only in 2 mg/L NAA the calli were friable and suitable for cell culture. For the initiation of cell suspension culture, 0.5 mg/L of each of treatments were cultured in 100 ml erlenmeyer flasks containing Murashig and skoog (1900) medium. The highest obtained cell pack during 1 month of growth was observed in the 2 mg/L NAA treatment. The highest dry weight was obtained at day 9 of the 20 day growth period.

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**THE EFFECT OF SALINITY ON GERMINATION FACTORS AND
GROWTH OF FIVE MEDICINAL PLANTS (*CARTHAMUS
TINCTORIUS*, *CARUM CARVI*, *SESAMUM INDICUM*, *FOENICULUM
VULGARE* AND CULTIVATED ENDIVE)**

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In order to study of salinity stress on germination characteristics in five medicinal plants. A factorial experiment based on completely randomized design with two factors in four replications was conducted in research laboratory of Islamic Azad University Miyaneh Branch in 2012. The first factor included 6 salinity levels (0, 50, 100, 150, 200 and 250 Mm) that induced with NaCl and second factor included five medicinal plants: *Foeniculum vulgare*, *Carum carvi*, *sesamum indicum*, *Carthamus tinctorius* and *Cichorium endive*. According to the results different levels of salinity stress and plant had significant effect on measured characteristics. Results showed that all the measured characteristics were decreased significantly due to salinity stress. Safflower and Endive in salinity have significant advantage sing over all other plants were. But the Committee of 150 and up to 90% germination could only safflower. Plumule length decreased more than radicle length in salinity stress. Different plant of chamomile with diversity in genotype has different responses to salinity stress. It seems that Safflower showed the highest salinity tolerance in germination stage within studied plants.



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INVESTIGATION OF EXCLUSIVE AND SYNERGISTIC
ANTIBACTERIAL ACTIVITY OF EDIBLE MEDICINAL VEGETABLES

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Infectious diseases are the major cause of death in human societies which is increasing with the irregular use of antibiotics and the rising trend of resistance to antibiotics in the treatment of infectious disease. Plants used in traditional medicine to treat many infectious diseases have been described in recent research. A number of them have a special place in the daily diet as well as edible vegetables. Among them can mention the garlic chives (*Allium ampeloprasum* L.), radish (*Raphanus sativus* L.), fenugreek (*Trigonella foenumgraecum* L.) and basil (*Ocimum basilicum*) [1,2]. Thus took place this study, In order to achieve safe, accessible, comparable to existing antibiotics new alternative therapies. Samples of these plants were collected from Local shopping centers in Tehran and from all parts of the plant; methanolic and aqueous extracts and crude juice were prepared at concentrations of 100, 150 and 200 mg/ml. Then, the antibacterial activity of each plant was tested with well diffusion method on gram-positive bacteria (*Staphylococcus aureus* and *Bacillus subtilis*) and gram-negative (*Escherichia coli* and *Klebsiella pneumoniae*), afterwards; the synergistic effect of the two plants was also studied and were compared to the Ampicilline and tetracycline antibiotics (10µg/ml) in terms of zone of inhibition (mm) after 48 hours and MIC (mg/ml). Radish showed the highest antibacterial activity and it was on *S. aureus* (23mm). The maximum synergistic effect related to vegetables- radish and on *S. aureus* (28mm) and *B. subtilis* (32mm) respectively. The overall results showed that the synergistic effect of two plant species was significantly more than a single plant (P<0.05) and was comparable with the standard antibiotics (radish MIC:0.5-0.62 and Tetracycline MIC:1 and Ampicilline MIC:2). Also, crude juice showed greater impact compared to methanolic and aqueous extracts. Thereupon herbal extracts of basil, leeks, radish and fenugreek can be effective to treat infectious diseases caused by pathogenic bacteria in different concentrations. So, with the proper use of vegetables that are in the daily diet during the treatment process of bacterial disease, with antibiotics; we will see more therapeutic effects and can be achieved to more complete successfully treated to shorten the duration and with fewer side effects of treatment.

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**KINETIC STUDY OF MECHANISM OF AN ENZYMATIC REACTION
CATALYZED WITH ESTERASE ENZYME**

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Esterase enzyme is a hydrolaseenzyme that splits esters into an acid and an alcohol in a chemical reaction with water called hydrolysis. One types of reactions that esterase catalyze is hydrolysis of 2,7-dichlorofluorescein diacetate[1].In this work, we investigated mechanism of this reaction in vivo using chemical kinetic simulation.According to the suggested mechanism, at first complex esterase enzyme-substrate is produced and this complex create product. Calculated diagrams which were obtained by applying this mechanism are in good agreement with experimental data.Thus, this mechanism can be suitable route for the enzymatic reaction.

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THE CONCENTRATION OF PARTHENOLIDE IN NATIVE
TANACETUM PARTHENIUM

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Feverfew (*Tanacetum Parthenium L.*) is one of the indigenous plants of Hamadan province which found in gardens and near of brooks. The use of *Tanacetum Parthenium L.* as herbal medicine is for muscle relaxation, blood dilution, antiheadache and antimigraine purposes [1]. The functions relevant to Parthenolide substances of the plant leave [2]. In this study, the leaves of native *Tanacetum Parthenium L.* were harvested from Morad Beik valley (south of Hamadan city) in 2012 May and June. The specimens were dried then extracted in chloroform using Soxhlet. The watery phase was separated with ethyl acetate then Parthenolide concentrations were measured by HPLC. The mean of Parthenolide concentrations were 0.617 and 0.584 mg/ml for May and June, respectively. We suggest more investigation on native types of *Tanacetum Parthenium L.* from other areas and their relationship to soil component.

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**INVESTIGATION ON THE EFFECT OF HORMONAL REGULATORS
ON THE ADVENTITIOUS SHOOT AND ROOT REGENERATION IN
*ARTEMISIA VULGARIS***

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Artemisia vulgaris L. (mugwort) belongs to the family Asteraceae and is a tall aromatic perennial herb that grows in the hilly district of India in areas up to 2,400 m in elevation [2]. As an alternative to seed propagation, our main goal has therefore been to develop an efficient and true-to-type micropropagation system. In vitro propagation is seen as an important tool in conservation as it could provide complimentary conservation options for plant species with limited reproductive capacities [1]. In this study the effect of the hormones 2, 4-D (0, 0.5, and 1 mg/L) and Kin (0, 0.1, and 1 mg/L) individually or in combination were used to induce adventitious shoots and roots. Root and stem explants were used under 3000 lux and a 16/8 light/ dark photoperiod. Results showed that in stem explants the highest number of shoots (1) and shoot length (3.25 cm) were obtained in 0.1 mg/L Kin. Also the highest number of roots (1.5) and root length (5.5 cm) were obtained in 0.5 mg/L 2, 4-D. In root explants. Experiments were carried out based on the complete random and factorial design.

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**EFFECTS OF *ALOE VERA* CREAM ON HEALING DIABETIC FOOT
ULCER**

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Diabetic food and diabetic food ulcer is still main reason of disabling in diabetics and in spite of many progress which was done in therapy and diagnosis diabetic ,but still diabetic foot difficulty is not removed. With regard to this fact that *Aloe Vera* plant gel have vitamins A, E, B, C and contain glycoprotein which prevent from pain and swell And accelerate improvement process and also contain polysaccharide that stimulate growth and skin, and produce thromboxane A₂ and B₂ and a type of prostaglandin which cause to reduce Platelet aggregation, vasoconstriction, we decide to measure effect of *Aloe Versa* on diabetic food ulcer.

In this interferred study, patient divided to two groups of 39? Both groups went under routine therapy (washing and dressing add to anti-biotic therapy). Anti-biotic therapy was identical in both groups. In addition to the second groups ulcer was dressing up with *Aloe Veracream*. Results related to influence of drug on healing was consider from one week after therapy and questionnaire contain demographic information of ulcer situation before and after therapy was completed and registered and then available information in questionnaire enter to SPSS software and was analyzed statistically by KAI SKOR test.In this study, we considered effect of *Aloe Vera* cream on diabetic foot ulcer and results of these analyses showed that there was meaningful difference between diabetic patient's foot ulcer, which used from *Aloe Veracream*, in comparison with control groups and foot ulcer size in these patients was less than control group.



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ANTIBACTERIAL POTENTIAL OF SOME IRANIAN MEDICINAL
PLANT EXTRACTS ON *PSEUDOMONAS AERUGINOSA*

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Pseudomonas aeruginosa is bacteria in hospital infections, particularly in patients with burns can cause many complications. In addition, this strain of bacteria that does not respond well to existing antibiotics. Today the herbal remedies can be very helpful in this regard. In this study investigated the antipseudomonas effect of four herbal parts includes pistachio nut peel (*Pistacia vera* L.), pomegranate peel (*Punica granatum* L.), oak gall and henna leaves (*Lawsonia inermis* L.). The plant samples were collected from local stores located in West of Tehran and aqueous and alcoholic extracts of the plant parts were prepared and appropriate dilutions 100, 150, 200 and 250 mg /ml of the extract was made. Then with well diffusion method herbal extracts were tested on agar medium containing *Pseudomonas aeruginosa* and were studied in analogy the antibiotics tetracycline and gentamicin (20 µg /ml) as standard antibiotics as the diameter of the inhibition zone (mm) and MIC. The observations were noted the laboratory media containing henna plant showed the highest activity against *Pseudomonas aeruginosa* (24±4.6) at the highest dilution. Also were existed significant differences between the effects of the herbs and standardized antibiotics (henna MIC: 0.5-0.55 and Tetracycline and Gentamicine MIC: 1). Both alcoholic and aqueous extracts had about the same MIC. Based on the results, herbal therapy can be contributory in patients with a foul *Pseudomonas aeruginosa*. Clinical studies on the role of traditional medicine in the treatment of these diseases can be show more comprehensive and more accurate information.

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SURVEY OF CALLOGENESIS BY TWO ARTEMISIA SPECIES
(ARTEMISIA VULGARIS AND ARTEMISIA DERACUNCULUS)

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Artemisia species are aromatic annual plants which had artemisinin, an antimalarial drug, were used as treatment for fever. Its derivatives have selective toxicity toward human breast cancer cells. These plants are widely dispersed throughout the temperate regions. The yield of artemisinin in these plants is low and chemosynthesis and conventional breeding methods have not been successful. For artemisinin production, in recent years, there are more progresses in molecular regulation of artemisinin biosynthesis via transferring genes of key enzymes involved in biosynthesis of artemisinin or inhibit the enzymes involved in other pathways competing for its precursors. Tissue culture and regeneration of are prerequisites for transformation [1]. In this research the effect of NAA (0, 0.5, 1 and 2 mg/L) and BAP (0, 1, 2 and 3 mg/L) was investigated on leaf explants of *A. vulgaris* and *A. deracunculus*. The experiments were carried out based on a complete random block and factorial design in 4 replicates. Results showed that the highest callus fresh weight (0.278 g) was obtained in *A. vulgaris* in 1 mg/L BAP, where as it was 0.648 g in *A. deracunculus* in 1 mg/L NAA. The obtained calli in *A. vulgaris* were compact where as the calli were friable in *A. deracunculus* except in 2 mg/L NAA treatment that calli were friable.

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**ENHANCEMENT OF FLAVONOID CONTENT BY SQUALESTATIN
AND METHYL JASMONATE IN CELL SUSPENSION CULTURE YEW**

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The gymnosperm genus *Taxus* from Taxaceae family is a rich source of a useful diterpene named “taxol”; a secondary plant compound of terpenoid group. It is known that production of terpenoids, flavonoids, phenolic compounds, alkaloids, and phytoalexins could be increased through elicitation, as an effective strategy to enhance the secondary metabolites [1]. In this research we have studied the effect of methyl jasmonate (MeJ) and squalestatin (SQ) on the flavonoid production in cell suspension culture of *Taxus baccata*. Squalostatins are a fungal metabolite that are potent inhibitor of squalene synthase [2]. Elicitation with methyl jasmonate and squalestatin caused quite marked in flavonoid production. Compared with the control, cell cultures treated with both elicitors achieved significantly ($p < 0.05$) higher levels of flavonoid.

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**SCREENING OF ANTBACTERIAL EFFECTS OF AERIAL SHOOT
EXTRACTS FROM SOME MEDICINAL VEGETABLES**

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Nowadays, with the advancement of science, pathogenic bacteria that can cause disease in humans, most bacteria are resistant to treatment that by taking an antibiotic treatment did not fully realize. So we decided that using herbal antibacterial activity to achieve better treatment. It could be noted the celery (*Apium graveolens L.*), cress (*Lepidium sativum L.*), coriander (*Coriandrum sativum L.*) and dill (*Anethum graveolens*). So, with the aim of achieving a new therapy, compared with existing antibiotics more effective than treatment with single-plant study was conducted. After collecting the plants from east of Tehran, from all parts of the plant, According to the single plant researches; methanol, hydroalcoholic and aqueous extracts were prepared at concentrations of 150, 200, 250 and 300 mg/ml and with well diffusion method, the antibacterial effect of each plant tested on gram-positive bacteria (*Staphylococcus aureus* and *Bacillus subtilis*) and gram-negative (*Escherichia coli* and *Klebsiella pneumonia* and *Pseudomonas aeruginosa*) and were compared to the Ampicillin and tetracycline antibiotics (10 µg/ml) in terms of zone of inhibition (mm) and MIC. The most antibacterial effects related to celery on highest concentration on *E. coli* (40mm) from methanolic extract (celery MIC: 0.6 and Ampicillin and tetracycline MIC: 1.00). According to the results; the methanolic extracts more potent than hydroalcoholic extracts. The evidences showed that significant differences were between the antibacterial effects of plant extracts and standard antibiotics ($P < 0.05$). Based on these results, the tested plant extracts including celery, dill, coriander and watercress can be used to treat bacterial infections and from concomitant use of these plants with antibiotics can be expected faster and more complete treatment.

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**THE CORRELATION BETWEEN MALONIC DEHYDRATE (MDA)
AND PROLINE CONTENT AND STIGMA-LIKE STRUCTURES (SLS)
IN TISSUE CULTURE OF SAFFRON**

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Saffron is dried stigmas of *Crocus sativus* L. and member of Iridaceae family which is propagated with means of corms, because it is a sterile plant and can't produce seeds. Each mother corm produces 8-9 cormlet every year. Corms are faced with much stress, such as water deficiency, during its development. Biochemical investigations are playing the predominant role in improving the quality of yield such as saffron. For this study the immatured flora bud were collected on October from two distinct areas, Torbat and Mardabad. The proline and Malondialdehyde content of petals from two areas and also free and combined water of both soils were measured. Then an experiment was set up using MS medium supplemented with BAP and NAA 10mg/L for petals of immatured flower from those areas. Proline is one of the metabolites which were produced by some plants when they were faced with water stress. Malondialdehyde (MDA) is a widely used marker of oxidative lipid injury whose concentration varies in response to biotic and abiotic stress. The aim of these studies is to show the correlation between amounts of proline and MDA content of petals and percentage of stigma-like structure from tissue culture by using petals. The results indicated that the highest proline (0.012 mg.dw^{-1}) and MDA ($0.024 \mu\text{mol.g}^{-1}\text{sw}$) content was obtained from those of Torbat with that gives rise to lower SLS formation on tissue culture (26%).

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**A SURVEY ON THE ANTIBACTERIAL PROPERTIES OF THE
ACHILLE MILLEFOLIUM AGAINST SOME PATHOGENE BACTERIA**

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These days surplus and inappropriate utilization of antibiotics causing increasing in pathogenic bacterial antibiotoxic resistance. Therefore, utilization of medical plants as an appropriate replacement of synthetic drugs, because of low production costs and low side effects have a significant importance. *Achillea millefolium* plant is used to utilizing as a medical plant in traditional medicine. The purpose of this research was surveying antimicrobial effects of ethanolic and methanolic extracts of *A. millefolium* plant against pathogenic bacteria.

Different concentrations of these two extracts from 0.05 to 0.4 g/ml were tested by disc diffusion method against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Bacillus subtilis*. The results of growth inhibition suggest that methanolic extract relatively have a good effect against some gram positive bacteria such as *B. subtilis* and *S. aureus*. *S. aureus* was the most sensitive bacteria against the two extracts. Based on these findings *Achillea millefolium* can be used as a disinfectant and antiseptic matter in drug industry and this plant and its extracts have the potential for using in controlling and treating infections caused by bacterial species such as *S. Aureus* and *B. subtilis*.



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**EFFECT OF BIOLOGICAL AND CHEMICAL FERTILIZER ON
MORPHOLOGICAL CHARACTERISTICS IN TWO BASIL
(*OCIMUM BASILICUM* L.) LANDRACES**

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Sweet basil (*Ocimum basilicum* L.) is a member of Lamiaceae family and one of the most important medicinal plants that its essential oil used in different medicinal industries. An experiment was done in research greenhouse of the Agriculture Faculty, Tabriz University on *Ocimum basilicum*, in 2010, to investigate the effects of nitrogen & biological fertilizers rate. Experimental design was factorial based on randomized complete block design (RCBD) in four treatments of fertilizer were tested in two stage. Treatments of fertilizer were inclusive of control, nitrogen fertilizer, biological fertilizer and biological & nitrogen simultaneously and second factor was two basil landraces. The results showed that plant height, number of leaves and number of plant branch have been affected by investigated biological fertilizer. The landrace Mazandaran was better than Tabriz in plant height, stem diameter and number of branches per plant and number of flower was not affected. Between of treatments investigated biological fertilizer has further effect of additive in morphological traits and after that was treatment syncretistic of biological and chemical fertilizer. The most of correlation was between number of branch and stem diameter ($r=0.91^{**}$) and length of inflorescence ($r=0.68^*$). The results showed that biological fertilizers could be superseded chemical fertilizer in the production of medicinal plant *Ocimum basilicum*.



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EFFECT OF CINNAMOMUN ZEYLANICUM NEESON LH AND ESTROGEN IN FEMALE RATS

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Cancer treatment due to fundamental limitations faced a lot of problems [1]. According to the chemotherapy drugs such as cyclophosphamide reduced sexual reproduction. The aim of this study was to investigate the effect of cinnamon extract on the hormones FSH and estrogen in reducing cyclophosphamide induced toxicity in rats by chemotherapy. In this study 50 mature and female rats of Wistar race were provided and were divided into 5 groups of 10 including control, Sham, Experimental 1, 2, 3, 4 and 5. groups 1, 2 and 3 were given cinnamon in doses 50, 100 and 200 mg/kg of body weight in gavage method and cyclophosphamide in doses 5 mg/ kg body weight by intraperitoneally injection in to rats. Experimental 4 were given cyclophosphamide in doses 5 mg/ kg body weight by intraperitoneally injection and Experimental 5 were given cinnamon in doses 200 mg/kg of body weight in gavage method. Then the hormonal changes of LH and estrogen were measured ($P<0.05$).

LH and estrogen levels in experimental groups 2 and 3 indicated significant increase as compared with experimental 4 group ($P<0/05$). In experimental 4 group indicated significant decrease in LH and estrogen compared with control group ($P<0/05$). Cyclophosphamide has cytostatics, Cytotoxicity and mutagens. The toxicity characteristic for cells to DNA alkylating the N7 position of guanine and plasticity crosslinking between DNA-DNA and DNA-Protein is causing performance degradation of nucleic acids and prevents DNA synthesis (2). Cyclophosphamide produces oxygen free radicals (3) and the appearance of toxic effects, including cell death, necrosis, is composed of multiple tumors (4). Thus, Cause significant decrease sex hormones in group 4, its because of this reason. Cinnamon has a positive effect on the reproductive system of male sex cells because significant increase (5). Compounds in the stem bark of cinnamon with effect on the axis of the hypothalamic - pituitary - gonadal, LH hormone are increased (6). cinamaldehyde to directly or indirectly increase the synthesis of nitric oxide. Nitric oxide, which in turn stimulates the secretion of LHRH and LH is increased (7, 8). Thus, the increase LH and estrogen in the experimental group compared to the 4 group its because of issue. The results showed that cyclophosphamide may have harmful effects on the secretion of sex hormones is partly due to improved cinnamon.

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**EFFECT OF ARBUSCULARMYCORRHIZAS ON METALS
ABSORPTION ON THREE GENOTYPE OF *MENTHA SPICATA***

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Mentha spicata is an aromatic plant with its essential oil used in food, pharmaceutical and cosmetic industries. This plant contains properties such as antifungal, antiviral, antimicrobial and antioxidant [1]. On the other hand arbuscularmycorrhizal fungi have most important mutualistic symbioses with higher plants. They are known to enhance plant growth through increased nutrient and water uptake and growth hormone production. In this study, two species of AMs (*Glomus etunicatum* and *G. mosseae*) were used to survey inoculation effects on amount of absorption of metals such as Na, K, Mn, Zn on three mint genotypes (Esfahan, Yazd and Kermanshah). Amount of metals on shoot and root plants were measured. There was a small increase in Na and K absorption and a decrease in amount of Zn and Mn in inoculated plants compared to controls.

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COMPARISON THE ANTIBACTERIAL ACTIVITIES OF AJOWAN,
BLACK ZIRA AND CINNAMON ESSENTIAL OILS USING AGAR
DIFFUSION METHOD

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Because of the prevalence or approaching of antimicrobial resistance bacteria and the side effects of chemical preservatives, trends to natural antibacterial as alternatives for commonly used antibacterials remarkably are increasing. The objective of this study was to evaluate the antibacterial activities of Ajowan, Black Zira and cinnamon essential oils using agar diffusion method. The antibacterial activity of Ajowan, Black zira and Cinnamon essential oils against the growth of 5 bacterial strains including *Listeria monocytogenes*, *Micrococcus luteus*, *Staphylococcus aureus*, *Bacillus cereus* and *Escherichia coli* were evaluated using agar disc diffusion method and the most active essential oil was chosen for determining its minimum inhibitory concentration (MIC) against *L. monocytogenes*. Briefly, 15 ml of warm medium was poured into 90 mm plastic petridish and after solidification the medium was inoculated with $100 \mu\text{l } 10^6$ CFU/ml of the microorganism under study. Then, 5 μl of essential oils were added to 6 mm sterile blank paper disks and placed on the medium in the petridishes. The petridishes were incubated at 37 °C for 18–24h. After incubation, the diameters of inhibitory zones were measured. All three essential oils used in this study showed strong inhibitory effect against all tested bacteria. The highest and broadest activity against studied bacteria was shown by Ajowan oil and among the tested bacteria, *E. coli* was the most resistant bacteria to this essential oils. Ajowan oil could create clear inhibitory zone against *L. monocytogenes* at dilution up to 1:32 (v/v). Consumption of food contaminated with pathogenic microorganism such as *L. monocytogenes*, *S. aureus*, *B. Cereus*, *E. coli* has been reported as casual agents of food born disease. The results of this study confirmed the possibility of using these three essential oils especially in case of Ajowan essential oil in food systems to prevent the growth of food borne bacteria and to extend the shelf life of processed foods.

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INVESTIGATION OF *MENTHA PULEGIUM L.* EFFECTS ON BROILER CHICKENS

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This study was undertaken to evaluate the effect of pennyroyal (*Mentha pulegium* L.) extract on hematological parameters and performance of broiler chickens. For this purpose, a total of 144 one-day-old Ross-308 type broiler chicks were randomly divided in to 4 treatments (one control and three experimental groups) in a completely randomized design with 3 replicates and 12 birds in each experimental unit and reared for 42 days old. The control group (C) only received control corn soy based diet and the experimental groups were defined as T1= control diet with 0.2% pennyroyal, T2= 0.3% pennyroyal and T3= 0.4% pennyroyal. Weight gain, feed consumption and feed conversion ratio were recorded each 2 weeks. At the end of the experiment, 2 bird selected for blood sample collection and slaughtered for measuring carcass including:

The result of analyzing data revealed that, pennyroyal significantly increased weight gain in experimental birds in T2 group at grower period and also in T1 group conversion ratio had significantly decreased compared with other treatment groups on starter and grower period ($P < 0/05$). Beside, in this experiment pennyroyal had no significant effect on average feed intake, conversion ratio, blood factors (triglyceride and cholesterol and white blood cell counts (including Heterophil, lymphocyte and Heterophil to lymphocyte ratio), carcass traits (carcass efficiency and relative weight of gizzard, liver, pancreas and spleen). The study concludes that different levels of *Menthapulegium* L not only had no significant side effect on blood parameters and average feed intake but also significantly improved weight gain in T2 group (inclusion rate of 0.3 percent in diet). The results were agreed with some reports [1, 2].

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THE ECONOMIC ESTIMATE OF THE BIOLOGICAL AND CHEMICAL FERTILIZERS COST TOWARD BIOMASS AND ESSENTIAL OIL YIELD IN TWO BASIL (*OCIMUM BASILICUM* L.) LANDRACES

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From ancient times, medicinal and aromatic plants (MAPs) are receiving considerable attention all over the world because of their vast untapped economic potential, especially in the use of herbal medicines. Because of multifarious potentialities and fine aroma chemicals, *Ocimum* possesses tremendous medicinal properties like anti-biotic, anti-stress, diaphoretic, diuretic, anti-pyretic, stomachic, anti-microbial, insecticidal, etc. The present study was done in research greenhouse of the Agriculture Faculty, Tabriz University on *Ocimum basilicum*, in the year 2010, to investigate the economic estimate of the biological and chemical fertilizers cost toward biomass and essential oil yield in two basil landraces. Experimental design was factorial based on randomized complete block design (RCBD) in four treatments of fertilizer were tested in two stage. Treatments of fertilizer were inclusive of control, nitrogen fertilizer, biological fertilizer and biological & nitrogen simultaneously and second factor was two basil landraces. However this experiment has done in greenhouse but according to the parameters of shoot's fresh weight and essential oil yield, it was tried to assess impure income in both cutting. By remunerative view, it is specified that impure income of biological fertilizer treatment in shoot's fresh weight and essential oil yield in first and second cutting has been more than that of other treatments.



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**EXPRESSION PROFILE OF SOME GENES INVOLVE IN
NICOTIANA BENTHAMIANA ALKALOID BIOSYNTESIS PATHWAY
UNDER ABIOTIC STRESSES**

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Nicotiana benthamiana is one of the important species of solanaceae family. The Solanaceae plants produce a variety of interesting biologically active products such as nicotine and tropane alkaloids [1]. Putrescine N-methyltransferase (PMT) is an enzyme that catalyses s-adenosylmethionine-dependent methylation of putrescine in one of the primary steps of nicotine and tropane alkaloids biosynthesis pathway [2]. Two tobacco members of the AP2/ERF-domain transcription factors family called *NtORC1* and *NtJAPI* were shown to upregulate the activity of the *NtPMT* promoter in *N. benthamiana* under environmental stresses [3]. In this study, the expression patterns of *NtPMT*, *NtORC1* and *NtJAPI* in shoots and roots of *N. benthamiana* were examined under methyl jasmonate, UV radiation and wounding treatments. Plants were harvested half an hour after each treatment. The expression pattern of examined genes showed differences between plant tissues under different treatments. The roots of wounded and UV radiated plants had high expression of *NtPMT* and low expression of *NtPMT* was observed in shoots of MJ treated and UV radiated plants. *NtORC1* was highly expressed in shoots of all treatments and roots of MJ treated plants and had low expression in roots of wounded and unwounded plants. *NtJAPI* was weakly expressed only in shoots of UV radiated plants and roots of MJ treated and wounded plants.

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**ETHNOBOTANICAL STUDY OF MEDICINAL PLANT OF SIRJAN
DISTRICT, PROVINCE KERMAN**

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Throughout human history, people used various materials from nature to cure their illnesses and improved their health [1]. Traditional medicine practices and ethnobotanical information play an important role in the scientific research. Ethnobotany is a specialized branch of plant science that aims to understand the complex relationships between human beings and plant life. The focus of ethnobotany is on how plants have been using, managing and perceiving in human societies [2]. In this research, we studied ethnobotany in Sirjan that is located in southwest of Kerman Province at the 29°27' northern latitude and 55°40' eastern longitude with an altitude of 1742m, and a surface area of 16217 Km. The ethnobotanical surveys were carried out from February to October 2012. The research method included asking folk about plants use, collecting plants using taxonomic methods and using identification keys to recognize plants.

Totally, 61 species were documented which 40 species used as medicinal. Lamiaceae family with seven genera is the largest family and the largest genus belongs to Malva L. genus with three species. Major Medicinal herbs were treated digestive diseases, also most plants part were used is reproductive structure. In consequence, despite the semi-desert of Sirjan and lack of rich vegetation, those plants found in this area have both medicinal and economical usage in people's life. Due to the indiscriminate harvesting of important species such as *Bunium persicum* B. Fedtsch., *Cuminum cyminum* L., *Zataria multiflora* Boiss by humans, it is necessary to protect this area in order to prevent extinction of important species.

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**EVALUATING ANTIBACTERIAL PROPERTY OF EUCALYPTUS
ESSENCE ON SUPERFICIAL SORES OF GRASS CARP
(CTENOPHARYNGODON IDELLA) JUVENILES' SKIN**

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Considering antibiotics and chemical disinfectants limitations in aquaculture which due to drug resistance, environmental problems and side effects in fish there is a trend to replacement by less harmful and cheaper materials increased. Herbal drugs have long time history in curing of diseases and usually have less side effects. Some of those curing effects for superficial sores in fishes were noticed by many aquaculturists (1,2). Main goal of this study was evaluating antibacterial property of eucalyptus essence on superficial sores of grass carp (*Ctenopharyngodonidella*) juveniles' skin.

During 2 weeks experiment (3 continuously days per week) the effect of this essence in different concentrations including 75,100,125 and 150 mg/lit in short time baths (30 min.) compared with salt(1%) and control for grass carp juveniles(15 ± 0.45 gr) in Dr. Keyvan's research center for fisheries sciences and marine technologies of Islamic Azad university branch of Lahijan. Two linear parallel sores (4-5 mm) created by a blade on fish's peduncles after scale removing and then exposed to solutions. Sampling of sores conducted for bacterial culture. Some physico-chemical parameters of water measured before and after treatment too. Sores photographed in every stage of experiment and assayed by Ts-view software. Results showed that eucalyptus essence had a decreasing effect on bacterial load of superficial sores of juveniles skin and the best results obtained by 150 mg/l that caused a significant decrease ($P < 0.05$) (7.30 ± 0.45 to 3.92 ± 0.39 log CFU/cm²). The photographs showed that fishes treated by eucalyptus cured completely while after 3 weeks control fishes contained not treated sores. According to these we concluded that 150 mg/l of eucalyptus essence can be prescribed to have shorter treating time (one week).

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**EVALUATION EFFECT OF MEDICINAL PLANTS INTERCROPPING
WITH GARLIC (*ALLIUM SATIVUM* L.) ON GARLIC YIELD IN AHVAZ
CONDITIONS**

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Because of Iran is one of the primary origins of Garlic, it has a large variety in Iran, and fortunately values of Iranian garlic medicines is more than the standard pharmacologic values. However, the average garlic yields in Iran due to lack of suitable management and use of new methods is less than the average global yield. To evaluate the potential of intercropping of Garlic with medicinal plants, this study was conducted as a Randomized Complete Block Design (RCBD) with three replications at the Ramin Agriculture and Natural Resources University in 2011-2012. Treatments were different combinations of Garlic with: Psyllium (*Plantago ovata*), Black Seeds (*Nigella sativa*), Ajowan (*Carum copticum*) that planted in a row replacement series arrangement. A pure stand of Garlic was also included in the treatments for comparison purposes.

Relative advantage of Garlic intercropping with medicinal plants in terms of Relative Value Total (RVT) was only shown in Garlic intercropping with Black Seeds with 2.04. The most of the amount of increasing actual yield was related to intercropping of Garlic with Psyllium with 1.78. The pure yield of Garlic (7330 kg/ha) and intercropping of Garlic with Ajowan (2300 kg/ha) were the highest and lowest yield, respectively. There was a high significant difference with high correlation between intercrop treatments in terms of the number of bolblet in Garlic. Finally, intercropping of Garlic with Psyllium because of the high amount of Actual Yield Total (AYT) is proposed in this region [1, 2].

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**THE EFFECTS OF LEAD HEAVY METAL ON PURSLANE
(*PORTULACA OLERACEAE* L.) SEED GERMINATION AND
SEEDLING TRAITS**

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The laboratory experiment as Completely Randomized Design was conducted to investigate the effects of different concentrations of Lead nitrite $Pb(NO_3)_2$ including 0, 200, 400, 800 and 1000 μmol on germination of purslane. 50 seeds were placed to petri dishes containing filter paper after surface sterile in four replications for each treatment. Some of characteristics such as sum of germinated seeds (SGS), mean of germination time (MGT), germination rate (GR), seedling dry weight (SDW), radicle length (RL), plumule length (PL) and seedling length (SL), percentage of germination (G) and seed vigour (SV) were evaluated. Results showed that Pb stress had significant effect ($p \leq 0.1\%$) on all of these characters except SGS and GR. SGS, PL, RL, SL, G and SV were decreased by increase in Lead nitrite. There were no significant effect between 0 and 200 as well as 400 and 800 μmol of Lead nitrite on SGS, PL, SL, G and SV. Whereas difference between 1000 μmol concentration and other levels was significant. PL shows 0.15% lost than control treatment. Results obtained from this research indicated that Pb stress has no significant effect on MGT and GR. It seems that in short term stress of Pb, purslane decrease stress intensity with induction of fast response, but, in spite of definition that exist for the tolerable plants of Pb, it does not seem to include purslane from tolerable plants to this heavy metal [1].

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**EFFECT OF DROUGHT STRESS AND PLANT GROWTH
PROMOTING RHIZOBACTERIA (PGPR) ON PHYSIOLOGY BASIL
HERB**

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Application of biofertilizers, especially plant growth promoting rhizobacteria (PGPR) and mycorrhiza fungus is one of the most important strategies for plant nutrition compared to chemical fertilizers, especially in sustainable management of agroecosystems. In order to investigate the Effect of drought stress and plant growth promoting rhizobacteria (PGPR) on physiology characteristics and essence yield of Basil (*Ocimum basilicum*) medicinal plant a green house experiment was conducted at Islamic Azad University of Gorgan Branch. Experiment was spilt plat conducted based on CRBD design with 3 replicate. Treatments were ncludedof 5 levels of PGPR strains (S1= Pseudomonades, S2= Bacillus, S3= Azospirillum, S4= combinations of S1+S2+S3 and S5= control without using PGPR) and 3 levels of drought stress (75, 50 and 25 percentage of field capacity). Results indicated that were significant effect of drought stress on dry matter accumulation and physiology characteristics in %1 and%5 probability levels. The effect of drought stress, PGPR and factors interaction were significant ($P \leq 0.01$) on yield of essence. With increase in levels of drought stress, decreased dry matter accumulation, yield of essence, chlorophyll and increased proline, soluble carbohydrates. The highest dry matter accumulation and yield of essence obtain of basil seed inoculation with bacterias combination S1 + S2 + S3 in D1 stress. Overall consumption all three types of bacteria with D1 drought stress can good replace for chemical fertilizers in cultivation of medicinal plant. [1,2].

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**THE EFFECT OF SALVIA OFFICINALIS ON LIPID PEROXIDATION
OF KIDNEY TISSUE IN DIABETIC RATS**

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Diabetes mellitus comprises a wide variety of metabolic disorders with a characteristic of chronic hyperglycemia. Hyperglycemia in diabetes enhances oxygen free radicals and leads to oxidative stress and lipid peroxidation. By the viewpoint of biochemistry, one of the most markers of lipid peroxidation in body is level of tissue malondialdehyde (MDA). Due to significant role of enhanced oxidative stress in development of renal damage in diabetics and according to various references on *Salvia Officinalis* (SO) with anti-oxidative effect in medical references, this study was conducted to evaluate the effect of chronic administration of SO on lipid peroxidation in kidney tissue of diabetic rats.

In this experimental investigation, 32 three month old albino Wistar male rats, weighing 250-300 g, were divided randomly into four groups: 1. control, 2. diabetic, 3. healthy under treatment with SO, and 4. diabetic under treatment with SO. Diabetes was induced by intraperitoneal injection of streptozocin (60mg/kg). Groups under treatment received rat food containing 6.25% of SO. Blood samples were obtained three weeks after the beginning of experiment and also after six weeks. Then the rats were anesthetized, kidneys were removed by opening the peritoneal cavity, then homogenized (10%) with normal saline, centrifuged and level of MDA according to thiobarbituric acid reactive substances (TBARS) method were measured by spectrophotometer ($\lambda=532\text{nm}$). Finally, data was analyzed with one-way ANOVA and Tukey's post-test. Serum glucose level in diabetic rats showed a significant increase as compared to healthy groups ($P < 0.001$). Regarding renal lipid peroxidation marker, SO treatment of control group did not produce significant reduction versus control group. In contrast, streptozocin-induced diabetes resulted in significant elevation of MDA content as compared to control group ($P < 0.05$) and SO treatment of diabetic group caused a significant reduction of MDA level ($P < 0.05$) versus diabetics. In general, it can be said that long term medication with SO as an antioxidant in rats with diabetes mellitus can partially protect kidney tissue against lipid peroxidation and oxidative stress and reduces its risk factors.



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**STUDY THE ETHNOBOTANY OF MEDICINAL PLANTS IN
ARSANJAN, FARS PROVINCE**

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Plants provided the initial natural needs of the human and this approach that plants are source of food, clothing, medicine and etc. excited the sense of curiosity and research about plants. Human has expressed and published a lot of studies scientifically with the human development and appearance of sciences. However, our environment is still full of unknown species with medicinal properties that may take many years to discover their properties. In some areas some particular plant species are used as medicinal plants that science has not achieved and it can be achieved through local experience. Providing a list of medicinal plants in different parts of the world is considered as the first step for the application of science in new technologies. Arsanjan district is an area of 1496 km² with different elevation from 1660 m to 3270 m in Dalneshin mountaintop and various vegetation. The studied area (53°18'E, 29°55'N) is located in the northeast part of Shiraz. In this study data were collected using semi structured interviews, field observations, preference and direct matrix ranking with traditional medicine practitioners and local local. The survey identified and recorded 62 plants species from 24 plant families used for treating diseases in Arsanjan. Lamiaceae with 11, Apiaceae with 11 and Asteraceae with 6 species were the families that have the highest number of species. with the highest number of species being used for gastrointestinal problems, followed by cold. Herbs and trees were the primary source of medicinal plants respectively. Diverse number of plants species are used for treating different diseases in Arsanjan. The youth should be encouraged to learn the traditional medicinal knowledge to preserve it from being lost with the older generation. knowledge can be used as a basis for developing management plans for conservation and sustainable use of medicinal plants in the area.



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**STUDY OF *IN VITRO* CULTURE IN *FOENICULUM VULGARE*
MILL EXPLANTS**

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The fennel (*foeniculum vulgare* Mill. Var. vulgare), an annual herbaceous plant, whose seeds are frequently used in homemade medicine and pharmaceutical industries. Generally, indiscriminate and incorrect exploitation of medicinal plants is not in too distant past, in addition to reducing traditional products, it causes the commencing of these resources which are to be endangered and it can be said fennel is not an exception from this rule [2]. Therefore, tissue culture of these plants is necessary. The aim of this research was to produce callus from fennel seedlings and investigate the ability of callus for organogenesis as a useful method in aggregate propagation. After surface disinfection, seeds were cultured on Whatman paper by sterile water in cube, solid MS. Seeds were not germinated on medium but 80% of seeds were germinated on Whatman paper, so this method is used as a basic method. Seeds were germinated after four days and after two weeks of culture they had normal roots, shoot and leave [1]. Cultures were exposed to 16 hours light per day. Explants were cultured on MS medium supplemented with 3% sucrose and solidified with 0.8 % (w/v) agar. The pH of the medium was adjusted to 5.8 before autoclaving. Two types of explants were used for this experiment; hypocotyls and leaf [3]. Between two kinds of explants, leaf did not respond to callogenesis. These effects of different combinations of 2, 4-D (2, 4-Diclorophenoxy acetic acid) and BAP (6-Benzylaminopurine) were studied. The callus from all explants was soft, watery and loose friable. Subculture was done every 3 weeks [4]. In regard to the results, it is clear that production of callus and organogenesis is possible and regulated in presence of PGRs and by this method this valuable species can be produced.

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**INVESTIGATION OF RUTIN CONTENT IN BLACK HENBANE
(*HYOSCYAMUS NIGER*) SEEDS FROM THREE DIFFERENT REGIONS
OF IRAN**

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Black henbane (*Hyoscyamus niger*) a species in solanaceae family has long been used as a medicinal plant. A strong-scented annual or biennial herb, which all its parts contain tropane alkaloids. Seeds of plants belonging to this family are well known for their alkaloidal secondary metabolites. But there exists some non-alkaloidal secondary metabolites which are less explored [1,2]. The objective of the present study was to determine the amount of bioactive non-alkaloidal secondary metabolites which is called "rutin" in the seeds of *hyoscyamus niger*. In this study, the amount of rutin content was quantitatively determined in henbane seeds, which were collected from three different regions of Iran (Karaj, Kermanshah, Kandovan; 1900, 2300 and 1300 m above sea level, respectively). Rutin content was obtained using high performance liquid chromatography (HPLC) apparatus. Results revealed that the amount of seed rutin basis on dry matter was 25.76 (mg.g⁻¹) for the location of Kermanshah (2300 m), also 24.71 (mg.g⁻¹) for the seeds from Kandovan location. The lowest seed rutin content (11.22 mg.g⁻¹) was recorded for the Karaj region.

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**EFFECT OF DIFFERENT DRYING METHODS ON QUALITY OF
ARTICHOKE LEAF**

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Drying herbs is one of the most important steps and playing an important role in the quality and quantity of their active substance. In this study the effect of drying methods on polyphenols, flavonoids and antioxidant activity of Artichokeleaf an experiment in a completely randomized design with 6 treatments and 3 replications was conducted. Plants were dried under five different temperature conditions (shade conditions, 40, 50, 60, 70 and 80 C°). Data analysis was performed using SAS software and mean comparison was done according to the Duncan's test. The results showed a significant effect of different drying temperature on the level of some biochemical substances. Analysis of variance showed that the highest antioxidant activity as well as phenolic content was observed in samples dried at 60 C°. Contrast to that flavonoid contents of samples dried in shad condition was at the highest concentration. In general, based on the quality of samples and the time used for drying it can be concluded that, using dryer is recommended for artichoke in environmental conditions in northern Iran and 60°C seems to be good.

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**THE EFFECT OF MAGNIFIED SALIN WATER ON THE
PHENOLICS AND FLAVONOIDS COMPOUNDS OF ARTICHOKE
LEAVES**

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Plants are naturally influenced by the Earth's magnetic field and electric fields between the earth and clouds. Salinity is one of the most important factors limiting cultivation in arid and semi-arid regions. A factorial design based on complete randomized blocks was performed to investigate the effect of magnified salt water on phenol and flavonoid accumulation as well as the antioxidant activity of artichoke leaves. Treatments included five levels of electromagnetic field intensity (zero, 3000, 6000 and 10,000 gauss) and four levels of salinity (zero, 3, 6, 12 ds/m sodium chloride). Total phenol and flavonoid were determined by spectrophotometer. Data analysis was performed using SAS software and mean comparison was done according to the Duncan's test. Between different levels of salinity and electromagnetic field intensity a significant difference was observed on measured parameters. Based on the obtained results, the highest amounts of both phenol (1.8 mg/g) and flavonoid (3.11 mg/g) was recorded when the plants treated with normal water magnified with 6000 gauss. Opposite to the finding of phenol and flavonoid contents, the highest antioxidant activity was observed in plants which were treated with saline water (6 ds/m) magnified with a magnetic field of 6000 gauss. Based on the obtained results it can be concluded that 6000 gauss seems to be appropriate to stimulate antioxidant activity of plant extract and reduce the salinity effect of water.

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**EFFECT OF SALICYLIC ACID AND SALINITY ON
MORPHOLOGICAL CHARACTERISTICS IN *MENTHA PIPERITA* L.**

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Mentha Piperita L. has been one of the admired herbs known since antiquity for its special aroma and medicinal value. Salt stress in soil or water is one of the major abiotic stresses especially in arid and semi-arid regions and has a major impact on plant growth and yield. Salicylic acid (SA) is an important signal molecule and essential hormone in plant immunity. SA alleviates decreases in photosynthesis under salt stress. In order to study the interaction of salinity and SA on morphological characteristics of peppermint, the experiment was done with five concentration of NaCl (0, 25, 50, 75, 100 mM) and three concentration of SA (0, 100, 200 ppm) in Garmsar. The experimental design was factorial in the base of complete randomized design with four replications. Growth characteristics were investigated including internode length, the root: stem ratio, fresh and dry weight and leaf area. The results showed that there are significant differences in interaction of salinity and salicylic acid on growth traits of peppermint. Generally, increase of salinity levels decreased all characteristics. Based on the results of this research, the best response of SA levels for spraying was 200 ppm under salinity condition, which can be effective on development the resistance of plants to salinity.

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**THE STUDY OF PHYTOCHEMISTRY AND ECOLOGY OF
ORIGANUM VULGAR PLANT IN THE REGION OF MAZANDARAN
PROVINCE**

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The increasing demand for herbal medicines, for the reason of decreasing the hazardous effect of the synthetic medicines, has made the researchers endeavor in the course of reviving the conventional medicine and identifying the effective compounds of the herbal medicines and their properties. This study was conducted in order to review the extract obtained from the leaf, flower and the young top branches of the herbal medicines in marjoram (*origanum vulgare* L.), qualitatively and quantitatively and also, the ecological review of this plant in the vegetative region in the province of Mazandaran. For this purpose, the plant of marjoram was gathered in two phases, vegetative and generative, from the region of Hezarjerib in Behshahr and the essential oil was extracted from this plant by the method of distillation using the Clevenger set. The average yield of the essential oil among the three organs (flower, leaf and top branch) in the region of Hezarjerib is 2.16%. The results of the simple interrelationship showed a meaningful relationship among some characteristics. Also, the chemical compounds of extract were determined and identified by the gas chromatography (GC) sets and the chromatograph gas connected to the mass spectrometer (GC/MSS). The Caryophyllen compounds in leaf and flower with 6.04%, and 4.35%, respectively, and Carvacrol with 8.21% had the most content in the harvested top branches from Hezarjerib. As totally we can introduce the top branch and the leaf as the favorable organs for this region because the most abundant, active substances contents were in two organs, also the organ of flower had much less effective material content.

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**THE EFFECT OF ARBUSCULAR MYCORRHIZAL FUNGI ON SOME
GROWTH FACTORS AND PHOTOSYNTHESIS PIGMENTS OF
JUNIPERUS EXCELSA. M.BIEB.**

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Juiperus excelsa from Cupressaceae is a plant with several medicinal and antioxidant properties. *J. excelsa*, occurs in the Alborz and other mountains of Iran. The aim of the present study is to investigate the effects of mycorrhizal symbiosis on some growth factors and photosynthesis pigments like chlorophylls and carotenoids. In this study we use two groups of Junipers, the control group without mycorrhizal structures and the mycorrhizal group with 27-30% symbiosis. Plant extract were obtained and Laboratorial tests were dispatched. The tests revealed a significant increase in root and shoot dry weight, and photosynthesis pigments such as chlorophylls but no significant difference in height and carotenoids.



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**THE EFFECT OF VERMICOMPOST AND NANO CHELATED IRON
FERTILIZER ON YIELD AND GROWTH OF SAFFLOWER**

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Safflower (*carthamus tinctorious* L.) is a member of Astaraceae family. Safflower is a branching, thistle-like herbaceous annual or winter annual plant and mainly cultivated as a oilseed. In this research the effect of vermicompost and nano chelated iron fertilizer on yield and growth of safflower was investigated in a field experiment in 2012 at Esfahan. Vermicompost is a product of biodegradation and stabilization of organic materials by interaction between earthworms and microorganism. Iron is essential nutrient element for plants and plays critical roles in important processes such as photosynthesis, respiration and nitrogen metabolism. This experiment was carried out as factorial in randomize complete design with three replication and factors were including: 1) vermicompost 0, 3, 6 ton/ha 2) nano chelated iron fertilizer 0, 1, 2g/lit. Results showed that the highest seed yield and growth of safflower obtained in 6ton/ha vermicompost+2g/lit nano chelated iron fertilizer treatment.

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**ANTIOXIDANT ACTIVITIES OF FRACTIONS FROM DIFFERENT
PARTS OF MANGROVE PLANT
AVICENNIA MARINA (FORSK.)VIERH.**

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The genus *Avicennia*, belonging to the *Avicenniaceae* family consists of about 8 widespread species in the world. In Iran, 1 species of this genus, *Avicennia marina* is identified, which is known as “Hara” in Persian. This plant has many medicinal properties such as anti-bacterial, anti viral, anti diabetic, antifungal, anticancer, antitumor and antioxidant. Free radicals cause many diseases in humans. Antioxidants neutralize free radicals and reduce the risk of cardiovascular disease and ictus. In the other hand antioxidants may inhibit the progression of cancer. Plants are rich sources of phenolic compounds (Flavonoids, tannins and anthocyanins) that are the most important natural antioxidants. The current study aimed at investigating the antioxidant activity of leaves, fruits, roots and propagules fractions. In so doing, methanol extracts were prepared by soaking method. Obtained extracts by solvent evaporation method and concentration was solved with a little methanol and moved on the column with the stationary phase, silica gel. Washing the column begins with a nonpolar solvent (petroleum ether) and the fractions was separated with gradual increasing of its polarity. Antioxidant activity of leaf, fruit, root and propagule fractions was evaluated by free radical scavenging DPPH (2, 2-diphenyl-1-picrylhydrazyl) test. The results indicated that the second fraction of fruit has the maximum antioxidant capacity and the second fraction of leaf has the minimum antioxidant capacity. This study may promise some implications for future research.



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**EVALUATION ANTIOXIDANT ACTIVITY OF LEAF AND SEED
EXTRACTS OF *PIMPINELLA ANISUM***

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The genus *Pimpinella* belonging to Apiaceae family consists of 170-180 widespread species in the world. *Pimpinella anisum* is one of the common species of this genus throughout the world. This plant has many medicinal properties such as anti-bacterial, anti viral, anti-fungal, anti-cancer and antioxidant. Free radicals cause many diseases in humans. Antioxidant neutralize free radicals and reduce the risk of cardiovascular disease and ictus. In the other hand antioxidants may inhibit the progression of cancer. Plants are rich sources of phenolic compounds (Flavonoids, tannins and anthocyanins) that are the most important natural antioxidants. The current study aimed at investigating antioxidant activity of leaf and seed extracts. In so doing, methanol, ethanol, acetone and distilled water extracts were prepared by soaking method. Obtained extracts by solvent evaporation method and concentration was used for demonstrating antioxidant activity of leaf and seed extracts by two methods, free radical scavenging DPPH (2,2-diphenyl-1-picryl-hydrazyl) test and the reducing power of iron ion. The results indicated that in free radical scavenging test, methanol extract of leaf has higher activity than seed extract. In reducing power of iron ion the methanol extract of leaf has the highest antioxidant effect between all of the extracts. This study may promise some implications for future research.



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**THE EFFECT OF WORM TEA AND NANO IRON FERTILIZER
ON SAFFRON FLOWERING**

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Crocus sativus L. (*Iridaceae*) commonly known as saffron is a perennial stemless herb widely cultivated in Iran and Greece. Among the elements important for plant growth and development iron plays an important role because of its peculiar physico-chemical properties. It is essential for the functional number of redox protein and free iron act as a catalyst in the fenton reaction. Leaching derived from vermicomposting called worm tea. Vermicompost leachate might contribute to plant development because it contains Nutrients, Hormones, humic acid and beneficial Microorganisms. In this research worm tea applied as a foliar spray. This experiment was carried out as factorial in randomize complete design with three replication and factors were including: 1) vermicompost tea (0,1kg/5lit,1kg/10lit), 2) nano chelated iron fertilizer (0,4,8 kg/ha). Result showed that the 1kg/10 vermicompost+8kg/ha nano chelated iron fertilizer treatment produced the highest flowering percentage.

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COMPARATIVE STUDY OF TOTAL PHENOLIC CONTENTS AND
ANTIMICROBIAL ACTIVITIES FOR FLOWERS, LEAVES AND
STEMS OF *SOPHORA MOLLIS* BACKER

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Sophora mollis (Royle) Backer with the Iranian local name “Zarrin gol” is a shrub plant that often grows wild in mountain habitats of central parts of Iran [1] (Karkas mountains) and in the margin of some gardens [2]. In this research, total phenolic contents of the methanol extracts of different parts of *S. mollis* from Qamsar were detected as gallic acid equivalent via the Folin–Ciocalteu assay [3]. Antimicrobial activities of flower, leaf and stem of methanol extracts of *S. mollis* were also determined using agar disc diffusion method [4]. The highest phenol concentration was related to leaf and the lowest one was for flower. The extracts of flowers, leaves and stems were also compared for antimicrobial activity, as mentioned above, against three strains of different microorganisms including one gram-negative, one gram-positive strain of bacteria and a fungi strain (*Staphylococcus aureus*, *Klebsiella pneumonia* and *Aspergillus niger*). Flower and stem extracts appeared antimicrobial activities only against *Klebsiella pneumonia*.

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**THE EFFECT OF SOWING DATES ON GROWTH, YIELD AND
ESSENTIAL OIL CONTENT OF *OCIMUM BASILICUM* L.**

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Due to study the effect of sowing dates on Basil, this research trial was carried out on randomized complete block design with three replications. The effects of sowing dates on 30 of April, 10 of May, 20 of May were studied on growth and herb yield of Basil. The results showed that the largest number of branches per plant (4.28) was obtained from the plants which were sown on 30 of April. Analysis of variance showed that sowing date was significant on plant dry weight and essential oil content of basil herb level of 1%. The highest dry weight (74.6g) and essential oil content (1.004%) obtained from the plant were sown on 30 of April. therefore, sowing this plant is recommended.

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**ANTIOXIDANT ACTIVITY OF METHANOL EXTRACT FROM
AERIAL PARTS OF *SOPHORA MOLLIS* BACKER FROM KASHAN**

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Genus *Sophora* L. belongs to the family Papilionaceae that have three herbaceous and shrub species in Iran [1]. Its other synonyms in some references are: *Sophora persica* (Boiss. & Buhse) Rech. f., *Keyserlingia Buxbaumii* Bunge & Boiss., *Sophora hortensis* (Boiss. & Buhse) Rech. f. [2]. This study reports in-vitro antioxidant potentials for methanol extract of the flowers, leaves and stems of *S. mollis*, obtained by Soxhlet. Evaluation was performed via radical scavenging activity (DPPH assay) [3] and inhibition of lipid peroxidation ability (β -carotene bleaching assay) [4] measurements, the order of activities was stem > leaf > flower for both assays, however the order for yields of extraction was leaf > flower > stem with 33.42, 18.78 and 14.28 value respectively. Having highest antioxidant activity of stem (more than 2 and 0.5 times to leaf and flower respectively) is not so expected generally; therefore this finding confirms that biological activity of different parts of the plants should be considered more careful for each case especially.

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**EFFECTS OF FE AND ZN FOLIAR APPLICATION ON GROWTH
THYMUS VULGARIS L. AND CONTENTS OF
THYMOL AND CARVACROL**

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Thymus vulgaris L. is a medicinal plant, its belonging to Lamiaceae family. As a valuable medicinal plant, *T. vulgaris* possesses antispasmodic, antiseptic, expectorant, carminative and antioxidative properties [1]. The main constituents of thyme include thymol, carvacrol and flavonoids often thought to have anti-bacterial, anti-flatulent and anti-worm characteristic [2]. The present study was carried out to find out the convenient rate of Fe and Zn foliar application for optimum quality of *T. vulgaris*. The pot experiments were carried out at the Researches Centre of Medicinal Plants & Ethno-veterinary, I.A.U., Shahrekord, Iran in 2011, to investigate the effect of the foliar application of Fe at the rates of 0.0 as a control, 200 ppm and 400 ppm as factor A, Zn at the rates of 0.0 as a control, 200 ppm and 400 ppm as factor B on growth characteristics, thymol and carvacrol contents of *T. vulgaris*. The isolation and analysis method for carvacrol and thymol were conducted according to previously published protocols [3]. The obtained mixture was injected to HPLC system (Knaauer, Germany). An HP 1000 series liquid chromatography system comprising vacuum degasser, quaternary pump, autosampler, thermostatted column compartment and diode array detector was used. Column Machery-NAGEL, Nucleosin-100-5 C18, Loop 20 µl was maintained at 30 °C. The result of analysis of variance of the experiment showed that different levels of the foliar application of Zn and Fe do have no significant impacts on growth characteristics viz. total dry matter and plant height. *Interaction effect analysis showed that treatment of 200 ppm Fe × 200 ppm Zn produced highest thymol in comparison other treatments.*

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ANTIOXIDANT ACTIVITY OF *EREMURUS PERSICUS* BOISS.
FLOWERS

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The genus *Eremurus* (Liliaceae) comprises of nearly about 50 species, and mainly restricted to central and western Asia and six species are known to exist in Iran. *Eremurus persicus* locally called "Serish" is widely distributed in south, east and west of Iran. The roots are used as natural glue. The leaves are traditionally used to relieve constipation and also in the treatment of diabetes, liver and stomach disorders. Polysaccharides have been reported as chemical constituents of species in the genus *Eremurus* [1]. In this research, *Eremurus persicus* was collected from Meymeh (Isfahan, Iran) in May 2012. Flowers were separated from other parts of the plant. After drying and powdering, the sample was extracted by Soxhlet apparatus using methanol solvent. Antioxidant activity was measured by two methods, namely scavenging of free radical (DPPH) and the inhibition of linoleic acid oxidation [2]. Moderate antioxidant activity was obtained in DPPH method with $IC_{50} = 105.44 \pm 1.62 \mu\text{g/mL}$. In the β -carotene/linoleic acid system, inhibition value was $80.27 \pm 1.71\%$, comparable to that of the synthetic antioxidant BHT ($94.74 \pm 1\%$). Total phenolic compounds content was also detected for the plant extract as gallic acid equivalent and a value of about $22.29 \pm 1.76 \mu\text{g/mg}$ was recorded.

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**STUDY OF ALLELOPATHIC EFFECTS of AQUEOUS EXTRACT
(*URTICA DIOICA L.*) ON GERMINATION AND GROWTH of *SINAPIS
ARVENSIS***

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Today, one of the most important solution to increases the function of the agriculture crops, is weed controlling. Chemical weed control methods, labor cost, and quality of soil, water and other biological systems, have negative effects on human health and food. One of the way's weed controls is allelopathy compounds. In order to Evaluation of different organ extractions and concentrations of extractions on *Sinapis arvensis* L., a lab experiment was conducted seed lab of Ramin Agriculture and Natural Resources University in Khouzestan. Treatments were arranged as a factorial experiment in a completely randomized design with three replications. Different concentrations at five level of *Urtica dioica* (5%, 10%, 15%, 20% and 25%) and control (pure water)) and three organs (root, stem and lief) Treatments were including five different concentrations extract of *Urtica dioica* (5%, 10%, 15%, 20% and 25%) and control(pure water) .The results showed that all organ extractions had significant effects(P <0.01) on Nettle germination, total germination, mean germination time, germination rate, seedling dry weight, root length, shoot length and seedling length At concentrations of 20% and 25%, germination was zero. With decreasing concentration, the percentages of the measured traits were reduced compared with the control treatment. Interaction effects showed the highest germination was in root and leaf in zero and 5% concentrations. Concentrations of 20% and 25% have a negative impact on the growth of roots and leaves but have a positive effect on stems growing. These results showed that allelopathy properties stem from other organs is less. Also, leaves on Nettle were the most effect in compared whit other organs. These results allelopathic effect of aqueous extract of nettle plant was well on wild mustard.

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**STUDY OF BALANGOU (*LALEMANTHIA ROYLEANA* L.)
GERMINATION ATTRIBUTES AND SEED VIGOR UNDER SALINITY
STRESS**

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Balangou (*Lalemanthia royleana* L.) seed is a good source of polysaccharides, fibre, oil and protein and has some medicinal, nutritional and human health properties is an annual plant of the Lamiaceae family. This seed adsorbs water quickly when soaked because of high mucilage content and produces a sticky, turbid and tasteless liquid, which can be used as a novel food hydrocolloid in food formulations. Soil and water salinity in arid and semi-arid regions, is one of the most important stresses, can severely limit crop production. This study was conducted to evaluate the effects of saline stress on seed germination base a completely randomized design (CRD) with three replications. The salinity stress were including: (0, 40, 80, 120 and 150 mM) and treated by applies of NaCl. The results showed that saline stress had a significant effect ($p \leq 0.01$) on quality and quantity of seedling parameters. Among pretreatment, 120 mM had the most positive effect on germination coefficient (GC), seed vigor and mean germination time (MGT). In order hand, these seeds at the minimum time had the most germination rate. The most and least rate of germination was obtained by control and 120 mM respectively. So under different level of saline stress, 80 mM had useful effect on radical length, more lateral roots and higher proportion of root to plumule, and the most root and plumule fresh weight was obtain by 120 mM treatments. In this research, Nutrient concentrations for Na^+ , K^+ , Ca^{2+} , Mg^{2+} and Cl^- were determined. So pretreatment of 120 mM reduced number of abnormal seedlings. Overall, application of 80 mM salinity on seed suggested for obtain uppermost germination characters.

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**GREEN SYNTHESIS OF SILVER NANOPARTICLES USING
SCROPHOLARIA STRIATA L, *THYMUS DAENENSIS* SUBSP.
LANCIFOLIUS AND *ARTEMISIA ANNUA* EXTRACTS**

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The development of reliable green process for the synthesis of silver nanoparticles is an important aspect of current nanotechnology research. Silver nanoparticles play a significant role in the field of biology and medicine due to its attractive physicochemical properties. Biological methods of nanoparticles synthesis using plant extract have been suggested as possible ecofriendly alternatives to chemical and physical methods. In this method, AgNPs (silver nanoparticles) are prepared using 20 ml aqueous extracts of *Scropholaria striata*, *Thymus daenensissubsp. Lancifolius*, *Artemisia annua*, treated with 90 ml aqueous 10 mM AgNO₃ and the color intensity of the extract was measured at 420 nm for different intervals. The color of the extracts changed after of incubation. Among the evaluated plants, *Artemisia* has potential to produce silver nanoparticle more than *Scropholaria striata* and *Thymus daenensissubsp. Lancifolius*. In deed we recognized production silver nanoparticles using centrifuging the synthesized, AgNP solution at 12,000 rpm for 20 min, measuring the UV–vis spectra of the solution and color changing of solution.

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EXPRESSION PROFILE OF SOME GENES INVOLVE IN *NICOTIANA BENTHAMIANA* ALKALOID BIOSYNTHESIS PATHWAY UNDER ABIOTIC STRESSES

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Nicotiana benthamiana is one of the important species of solanacea family. The Solanaceae plants produce a variety of interesting biologically active products such as nicotine and tropane alkaloids [1]. Putrescine N-methyltransferase (PMT) is an enzyme that catalyses s-adenosylmethionine-dependent methylation of putrescine in one of the primary steps of nicotine and tropane alkaloids biosynthesis pathway [2]. Two tobacco members of the AP2/ERF-domain transcription factors family called *NtORC1* and *NtJAP1* were shown to upregulate the activity of the *NtPMT* promoter in *N. benthamiana* under environmental stresses [3]. In this study, the expression patterns of *NtPMT*, *NtORC1* and *NtJAP1* in shoots and roots of *N. benthamiana* were examined under methyl jasmonate, UV radiation and wounding treatments. Plants were harvested half an hour after each treatment. The expression pattern of examined genes showed differences between plant tissues under different treatments. The roots of wounded and UV radiated plants had high expression of *NtPMT* and low expression of *NtPMT* was observed in shoots of MJ treated and UV radiated plants. *NtORC1* was highly expressed in shoots of all treatments and roots of MJ treated plants and had low expression in roots of wounded and unwounded plants. *NtJAP1* was weakly expressed only in shoots of UV radiated plants and roots of MJ treated and wounded plants.

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**STUDY ON THE POTENTIAL OF *Vitex PSEUDO-NEGUNDO* TO
REGULATE THE ESTEROID HORMONE LEVELS OF RAINBOW
TROUT (*ONCORHYNCHUS MYKISS*) BROODSTOCKSFED WITH
FISHMEAL-FREE DIETS**

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The global shortage of fishmeal to use in the formulated aquafeed and the need of producing high- nutrient density (HND) diet based on the plant proteins (PPs) are the most important challenges faced on the cost-benefit production of aquatic species[1]. In spite of reducing the cost of aquafeeds when to include PPs in the diets, PPs reduce the nutrient bioavailability and disrupt the levels of esteroid hormones (EHs) of fish fed the diets included with high levels of PPs. In this regard, *Vitex Pseudo-Negundo* (VPN) as a naturally regulating candidate of EHs was included at five levels (1, 10, 100, 1000 and 10000 mg/Kg basal diet) in the diet of one- year rainbow trout broodstocks (359 ± 9.6 g) for 126 days. The profile of EHs (esterogen, testosterone, β-estradiol and progestrone) in the experimental fish (n=30) and fecundity were measured in the first and final days. Results showed that the use of 1000 mg VPN per Kg diet reduced significantly (P≤0.05) the ratios of EHs profiles (esterogen: progestrone; esterogen: β-estradiol and testosterone: β-estradiol). The normal ratios of EHs profiles with the least disturbance range is one of the most important external stimuli affecting on the reproduction of rainbow trout. The fecundity of broodstocks showed a significantly trend (P≤0.05; r² = 72.3 %) with an increase in the VPN level in the diet. Based on the results, using 1000 mg/KgVPN in the diet of rainbow trout broodstocks was practical.



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**TOTAL PHENOLIC CONTENT IN GUM TRAGACANTH OF
ASTRAGALUS GOSSYPINUS AND *ASTRAGALUS PARROWIANUS***

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Gum tragacanth is a dried exudation obtained from the stems and branches of Asiatic species of *Astragalus* [1]. It has been used as a stabilizer, emulsifier and thickener in food, pharmaceutical, cosmetic industries [2]. Iran is the original source and one of the important places for diversity of *Astragalus* species. Phenolic compounds are believed to account for a major portion of the antioxidant capacity in many plants [3]. *Astragalus gossypinus* and *Astragalus parrowianus* species, which is the producer of tragacanth, belongs to Fabaceae family, is mostly spread in Alborz and Zagros Mountains, Iran. The gum tragacanth (20-25 g) of wild growing *A. gossypinus* and *A. parrowianus* collected from at Khonsar Mountains, Isfahan. The total phenolic compound contents in the gum tragacanth of *A. gossypinus* and *A. parrowianus* were determined by a colorimetric assay, using the Folin–Ciocalteu reagent. The results showed that there were significant differences between the gum tragacanth of *A. gossypinus* and *A. parrowianus* for total phenolic compound. The results also indicated that the two species of gum tragacanth being studied in this paper exhibited significantly different physicochemical properties.

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**EFFECTS OF UV ON ANATOMICAL STRUCTURE IN
*VIOLA TRICOLOR***

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Viola is an ornamental plant of the family violaceae. Violaceae with about 400-500 species is distributed around the world. The genus *Viola* has annual, biennial and perennial species. *V. tricolor* is a famous member for its tree coloured flowers, and has shortluffy branched stems. This species is remarkably tolerant against the ultra violate radiation because of its big amounts of flavonoids and epidermal mucilage. Sun radiation constantly impacts the earth with approximately 50% visible light (400-800 nm), 40% infrared radiation (1300-1700 nm), and 10% ultraviolet radiation (10-400 nm). UV is divided conventionally to A (320-400 nm), B (290-320 nm) and C (220-290 nm) types. In a research we put the palnts under **a** and **b** types of UV radiation for 8 hours each day, after a period of 30 days we observed morphological and structural changes in the anatomy of the treated plants. Ultraviolet radiation affects the anatomy at different stages of plant growth such as reduction of stem length, leaf surface and increases the leaf thickness.

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**THE EFFECT OF BIOLOGICAL FERTILIZER ON ESSENTIAL OIL
WEIGHT PERCENT AND YIELD OF *THYMUS PUBESCENCE***

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Medicinal plants are rich repositories of secondary metabolites and it means they are repository of active ingredients for many of the drugs. However the biosynthesis of secondary metabolites is controlled genetically, but their construction are strongly influenced by environment factors. This project was performed in field condition by using factorial design in randomized complete blocks with 3 replications in 2011. The treatments were inoculated seeds (free inoculated, inoculated with *Glomus intraradices* & *Glomus mosae*) and seedlings (free inoculated, inoculated with *Glomus intraradices* & *Glomus mosae*). Analysis of variance showed that the effect of block and inoculated seedlings with biological fertilizer were different for essential oil weight percent ($\alpha \leq 0.01$). Also, the effect of inoculated seeds ($\alpha \leq 0.05$) and seedlings ($\alpha \leq 0.01$) were significant for essential oil yield. Inoculated seedlings with *Glomus intraradices* and free inoculated seedlings had the highest & lowest quantity of essential oil percent with 1.46% & 0.78%, respectively. The highest and lowest essential oil weight percent were observed in interaction of *Mosae* * *Intraradices*, *Mosae* * control and *Intraradices* * control treatments with 1.58%, 0.78% & 0.71%, respectively. The highest essential oil yield belonged to inoculated seeds and seedling with *Intraradices* with 15.62kg/ha and 20.57kg/ha, respectively. Essential oil yield was the lowest in non-inoculated seedlings with 5.10kg/ha. According to the mean comparison results, it was observed that interaction of inoculated seeds and seedlings had the highest and lowest amount of essential oil yield in *Intraradices* * *Intraradices*, control and *Intraradices* and control * control with 26.96kg/ha, 5.77kg/ha and 3.16, respectively.



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**FIELD EVALUATION OF NANOENCAPSULATED
CUMINUM CYMINUM ESSENTIAL OIL ON CITRUS RED MITE**

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Citrus red mite, *Panonychus citri* McGregor is one of the most important pests of citrus orchards in the worldwide and Iran, Mazandaran. The use of synthetic pesticides is the most common method for controlling this pest. Because of the high capacity of fecundity and daily increasing mite's populations, studies for toxicity of newer pesticides are necessary. In this research, the essential oil of *Cuminum cyminum* L. was encapsulated by insitu polymerization of oil/water emulsion in nano scale. Then contact toxicity of produced nanoencapsulated essential oil (NEO) was examined against the pest and compared with a conventional acaricide (fenpayroximate) in the field condition. Using NEO, the population of *P. citri* were significantly decreased compared to control. Moreover, there was no significant differences between NEO and fenpayroximate. Therefore, it is time to focus green chemistry processes and commercialization of natural products as green pesticides on the way to the expansion and application of known essential oils and their constituents by highly developed formulation technologies.



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EVALUATION OF ANTIOXIDANT COMPOUNDS OF *PHYSALIS ALKEKENGI* IN DIFFERENT PHENOLOGICAL STAGES

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Physalis alkekengi (Solanaceae) is a natural source containing numerous antioxidant compounds advising for the treatment of wide range of diseases including gout, kidney stone, and etc [1]. Antioxidants like ascorbic acid are beneficial to prevent gout and other urate-related diseases [2]. Levels of antioxidants can vary with genotype, stage of maturity, plant part consumed, conditions during growth, and post harvest handling [3]. In this paper, the contents of some antioxidant compounds of *P. alkekengi* in the phenological stages were determined. To such aim, Different parts of *P. alkekengi* including leaves, calyxes, and green and orange fruits harvested from around the Tonekabon, Iran. They were dried in dark and powdered and then ascorbic acid [4], soluble sugar [5], and flavonoid compounds like luteolin and quercetin contents [6] were determined. The results showed that the leaves in green fruit stage contained the greatest amount of luteolin (0.198 ± 0.001 mg/gdw) while quercetin was only found in the leaves of vegetative and flowering stages. In addition, the orange calyx contained the highest amount of ascorbic acid (12.65 ± 1.19 mg/g fw) that such content was also high in the orange fruit (10.815 ± 0.528 mg/g fw). Moreover, leave, fruit, and calyx in maturing stage exhibited highest level of soluble sugar content. These results suggest that the extract of *P. alkekengi* in different phenological stages is a valuable source of antioxidant. Therefore, such plant may propose for the treatment of wide range of diseases due to oxidants such as gout, and also its orange fruit and orange calyx are recommended as the most appropriate tissues for pharmacological studies.

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COMPARATIVE ANALYSIS OF HEADSPACE VOLATILES OF
IRANIAN DAMASK ROSE GENOTYPES (*ROSA DAMASCENA* MILL)

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The chemical compositions of floral scent from two distinct genotypes of Iranian *Rosa damascena* flowers were isolated at six developmental stages by using headspace extraction. The main floral headspace components were Phenyl ethyl alcohol, β -citronellol, α -Pinene, Benzyl alcohol and Geranyl acetate. In the both of genotypes by flower development the relative percentage of Phenyl ethyl alcohol increased. β -citronellol was highest in Stage 4 (46.98%) and Stage 3 (45.15%) in the first and second genotype respectively. Also this result indicated that the first stage of two genotypes had the lowest of this component. Benzyl alcohol was highest and a major component in the second genotype and increased with floral development however the first genotype had trace amount of this component. Acetate esters are important contributors to the aroma of different rose flowers. Geranyl acetate was detected in the highest in Stage 4 (11.57%) and Stage 3 (22.69%) in the first and second genotype respectively and the early stage of two genotypes (Stage 1 and 2) had without of this component.

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**PREDICTION OF RUPTURE FORCE AND SHRINKAGE FOR
TEREBINTH FRUIT IN INFRARED DRYERS USING ARTIFICIAL
NEURAL NETWORKS**

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Purpose of this study was to predict the force rupture and shrinkage of terebinth fruit during infrared drying using artificial neural networks. Terebinth (*Pistacia Atlantica* L) is an ancient and long life tree with about 5 m height. May and June is the time of terebinth seed ripening [1]. Terebinth seed is used to flavor buttermilk and animal oils and also used to make pickles. Three effective factors of air temperature, air velocity and power radiation in infrared dryers considered as independent variables for artificial neural network. An artificial neural network (ANN) is a computer program capable of learning from examples through iteration, without requiring prior knowledge of the relationships between process and product parameters [2]. Data necessary to create training, testing and evaluating processes were collected by a laboratory dryer. Results showed that the cascade forward back propagation network with topology of 3-2-3-1, training algorithm of Levenberg-Marquardt and threshold function logarithmic sigmoid was the best structure for prediction of rupture force. Also that the cascade forward back propagation network with topology of 3-3-4-1, training algorithm of Levenberg-Marquardt was the best structure for prediction of shrinkage. The highest values of coefficient of determination for rupture force and shrinkage were 0.9896 and 0.9887, respectively.

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STUDY OF UV EFFECTS ON FLAVONOIDS CONTENT IN
VIOLA TRICOLOR

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Viola is an ornamental plant of the family violaceae. Violaceae with about 400-500 species is distributed around the world. The genus Viola has annual, biennial and perennial species. *V. tricoloris* famous member of Viola for its tree coloured flowers, with fluffy, and very short branched stems. This species is remarkably tolerant against the ultra-violet radiation because of its big amounts of flavonoids and epidermal mucilage. Ultraviolet radiation affects flavonoid production and raises its content in the plants. The flavonoids are an important group of plant secondary metabolites and have optical absorption and fluorescence properties. In a research the plants were under **a** and **b** types of UV radiation for 8 hours each day, after a month the content of the flavonoids like rutin were increased.

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COMPARATIVE GERMINATION CHARACTERISTICS AND INITIAL GROWTH IN TWO CULTIVARS OF BASIL (*OCIMUM BASILICUM* L.) UNDER DROUGHT STRESS

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Plant response to drought stress is an important consideration for establishing irrigation management strategies when water supplies are limited. Physiological effect of six levels of water stress (0, -3, -6, -9, -12 and -15 bar) was studied on seed germination in two different basil cultivars (*Ocimum basilicum* cv. green and *Ocimum basilicum* cv. purple). Polyethylene glycol (PEG) was used to provide appropriate water potentials. Results showed that effect of cultivars were significant on germination percentage, MGT (mean germination time), radicle length, plumule length and seed vigor index (SVI). Results indicated that *O. basilicum* cv. green had higher germination percent, germination rate and lower MGT in all drought levels. By contrast, *O. basilicum* cv. purple had higher plumule length, radicle length and SVI. Generally results of this experiment proved that *O. basilicum* cv. purple is more tolerant than *O. basilicum* cv. green under drought stress [1,2].

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**ANTIOXIDANT ACTIVITY OF METHANOLIC EXTRACTS OF LEAVE,
STEM AND FLOWER OF *DOREMA AUCHERI***

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Dorema aucheri from Apiaceae family is an endemic plant growing in Yasouje, Iran [1]. This plant is used as food and its extracts are recommended for the treatment of a wide range of diseases including diabetes, liver damage and high blood pressure and triglyceride [2]. To conduct this study, leaves, stem, and flower of *Dorema aucheri* were collected from near Yasouj, Iran. Then, they were dried in dark and powdered. Antioxidant activity of extracts was measured with inhibition of fatty acid oxidation test [3] and antioxidant reducing power (FRAP) [4]. Further, total Phenol [5], flavonoid and anthocyanin contents [6] of plant samples were also determined. The results showed that the stem of *D. aucheri* contained total phenol and anthocyanin, 22.72 mg GAq/g dw and 19.23 mg/g dw respectively, greater than those of the other samples tested. The highest amount of flavonoid (1.95 mg Qq/g dw) observed in flower. All of different extracts exhibited a good antioxidant activity based on inhibition of fatty acid oxidation assay by which the maximum contents was reported in leaves (48.52 %) and flower (54.24%) of *D. aucheri*. In addition, the iron reducing power (FRAP) was also high in the stem and flower of such plant. These results suggest that the methanolic extracts from Different parts of *Dorema aucheri* are a valuable source of antioxidant and scavenging free radical effectively. Thus, such plant may propose for the treatment of wide range of diseases due to oxidants.

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**EFFECT OF SALT STRESS ON GERMINATION AND SEEDLING
GROWTH OF FENNEL (FOENICULUM VULGARE. MILL)**

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Salinity is one of the major environmental factors that lead to a deterioration of agricultural land and reduction in crop productivity worldwide. This research was carried out in order to test the effects of different salinity levels on germination and early growth of Fennel seedlings. The experiment was conducted using completely randomized design in four replications at Applied and Scientific University of Urmia in 2012. Experimental treatments include 4 levels of NaCl concentration (0, 50, 100 and 150 mM). Results showed that the percentage and speed of germination, plumule length, radicle length and wet and dry seedling weights were higher in control treatment. With increasing salinity level, germination and seedling growth decreased significantly. This reductions indicate this plant isn't advisable to cultivate in saline soils [1, 2].

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**GROWTH ANALYSE OF DILL INFLUENCED BY STRIP
INTERCROPPING WITH BEAN**

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One field trial was conducted at Tabriz University Agricultural Research Station in 2009 to determine the appropriate cropping pattern for the dill-bean intercropping system for optimum growth. The experimental design was a randomized complete block design with three replicates. Treatments consisted of strip intercropping pattern including six ratios (2: 2), (2: 4), (4: 2), (4: 6), (6: 4) and (4: 4) bean and dill respectively and two treatments of sole cultures of both species. Results of the growth analysis indicated that among cropping patterns, strip intercropping (2: 2) had highest amount of DM, CGR and RGR. Also (6: 4) and (4: 2) cropping patterns showed the minimum amounts of these indices. The highest and lowest value of dill biological yield per plant was attributed to (4: 2) intercropping and sole culture of this plant respectively. Thus, in order to increase yield and physiological traits, it can be suggested that use the (2: 2) intercropping pattern or 50% bean to 50% dill (the average density of each plant) and more interference between bean and dill.

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**STUDY ON THE ANTIMICROBIAL EFFECT OF EXTRACTS OF
STIGMAS AND STAMENS OF SAFFRON ON THE GROWTH OF
STAPHYLOCOCCUS AUREUS IN HAMBURGER**

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In this research, antimicrobial activity of different solvent extracts of stigmas & stamens of Saffron (*Crocus Sativus*) was investigated on *Staphylococcus aureus* growth with different concentrations (10,000, 15,000, 20,000 and 30,000 mg/L) in hamburger. Purified *S. aureus* was inoculated to hamburger and then stored at -10°C . Samples were subjected to microbiological analyses (total viable count and numbers of *S. aureus*) at different time intervals (15, 30 and 45 days). Results showed that total viable count and the number of *S. aureus* in all samples with different concentrations of extract declined during storage. This effect was significant at day 15 and 30 for *S. aureus* and total viable count, respectively. The highest concentration of extracts of stigmas & stamens of Saffron caused maximum reduction in *S. aureus* population and total viable count. These data indicated that extracts of stigmas & stamens of Saffron can exhibit antimicrobial activity against *S. aureus*, so it can be considered as an alternative natural preservative in such food products. As Saffron has natural antimicrobial properties and is growing in many regions in Iran increasingly, thus, the extract of some parts of this plant is applicable in food products. On the other hand, the importance of *Staphylococcus aureus* in meat products as hamburger has been proven previously due to manual handling or post-processing contamination. With regard to the above mentioned, usage of Saffron is considered essential in meat products as a natural antimicrobial agent to prevent food poisoning and spoilage. Perhaps, saffron extract has a strong antimicrobial influence against many known pathogens in food products, but it needs to be performed in researches about the effect of this extract on sensory properties and total acceptance in near future [1,2].

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COMPARISON OF CHEMICAL COMPONENTS AND YIELD OF THE
ESSENTIAL OIL OF MYRTLE LEAVES UNDER DRYING METHODS

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Drying process increases the shelf life by slowing microorganisms' growth and preventing certain biochemical reactions that might alter the organoleptic characteristics [1]. *Myrtus communis* L (myrtle) (Myrtaceae) is an important medicinal and aromatic plant, because of the high essential oil content in its leaf, flower and fruit glands. Leaves and berries are sources of essential oil that have various medical properties [2,3]. In Iran, the species commonly known as "Mord or Mort" is abundant in the Zagros Mountainous Range of the country [3]. The leaves of *Myrtus communis* L were dried by drying methods including shade-drying and oven at 40 °C. The essential oils of fresh and dried samples were obtained by hydro-distillation and, were analyzed by using gas chromatography–mass spectrometry (GC–MS). The highest essential oil yield was obtained by shade-drying. The main components in essential oils of fresh and dried of *M. communis* L leaves were α -pinene, 1,8-cineole, α -terpineol and linalool. The result of analysis of variance of the experiment showed that different drying methods of *M. communis* L leaves have significant impacts on oil yield and chemical composition.

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**FORMATION OF A PLANT DATABASE FOR TUBERCULAR
THERAPY**

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Plants as one of the most important natural resources, which have more compatibility with human body, were consistently considered as one of the most treatment options [1]. Usually herb selection is done by trial and error. This strategy has a high cost and high workload. In addition, there is the possibility of selecting plants that generally have been known as medical herb. Because the researchers usually work according to their information and in many cases despite the high cost and much effort, cannot get appropriate answers. Since reviewing all plants is impossible, we can use the bio/cheminformatics methods to reach the candidate plants. In this study, we used these methods to find new synergistic herbs with anti-tubercular drugs. It is based on the fact that drug along with some herbs, lead to increase the formulation potency, reducing toxicity and side effects, enhancing the bioavailability, decrease dose rate and preventing the development of resistant strains [2]. For this purpose, the synergistic herbs were collected from various sources and their active chemical structures were drawn. Then for each of these compounds a similarity search was performed at higher or equal 95% in the Pubchem Structure Search and the Enhanced NCI Database Browser 2.1 and found matching compounds. By finding the plant origin of these matching compounds, a library was made with over 200 new plants which probably have a synergistic effect. This amount is much more than primary synergistic plants that we collected and also many of them never tested for pharmaceutical purpose. Most of the new plants were belonging to *Fabaceae*, *Cupressaceae* and *Lamiaceae* families and about 100 plants were native Iranian. Finally, we can say this low-cost and easy way can be used before trial and error tests to find and screen the considered plants with a high probability of bioactivity.

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THE EFFECT OF INOCULATED SEEDS WITH ARBUSCULAR MYCORRHIZA FUNGI ON ESSENTIAL OIL COMPOUNDS OF *THYMUS PUBESCENCE*

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Coexistence of fungi has been observed with a variety of medicinal and aromatic plants and the symbiotic improve the efficiency of this group of plants. This project was performed for investigation the effect of inoculated seeds with Arbuscular mycorrhiza fungi on weight percent and essential oil yield of *Thymus pubescence*, at Research Institute of Alborz, as randomized complete blocks with 3 replications in 2011. Factors included three levels: without inoculation (a_1), inoculation with *Glomus intraradices* (a_2) & *Glomus moosae* (a_3). The results showed that the effect of inoculated seeds were different for α -pinene, β -pinene, myrcene, α -terpinene, p-cymene, δ -terpinene, linalool, terpinen-4-01, α -terpineol, neral, geranial, thymol, carvacrol and yield of thymol, carvacrol & p-cymene ($\alpha \leq 0.01$) and for comphene, germacrened and spathulenol ($\alpha \leq 0.05$). The average comparison of inoculated seeds indicated that *Glomus moosae* had the highest percent of p-cymene, terpinen-4-01, neral, carvacrol and germacrened with 10.74%, 4.59%, 0.50%, 64.50% and 0.85%, respectively. Also, the highest percent of α -pinene, comphene, myrcene, β -pinene, linalool, spathulenol & α -terpineol belonged to control treatment (a_1) with 2.26%, 0.93%, 0.44%, 0.93%, 5.51%, 0.69% & 0.55%, respectively. *Glomus intraradices* treatment with 0.65%, 3.43%, 1.01% and 9.29% had the highest percentage of α -terpinene, δ -terpinene, geranial and thymol, respectively. The highest yield of carvacrol and p-cymene were observed in *Glomus intraradices* treatment with 9.61% and 1.54%, respectively. The highest yield of thymol belonged to control treatment with 1.16%. According to the yield and compounds percent of *Thymus pubescence* essential oil, the most suitable treatment could be applied.



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**IN VITRO ANTHELMINTHIC ACTIVITY OF TOBACCO
EXTRACTS AGAINST MARSHALLAGIA MARSHALLI**

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This paper describes anthelmintic aqueous and alcoholic extract of tobacco against of marshallagiamarshalli. The most common of the abomasum nematoda parasite of domestic and wild small ruminant in Iran is marshallagiamarshalli. For treatment this parasite used chemical drugs such as levamisole. Tobacco plant has alkaloid material that is effects antiparasitic. Therefore, decided in vitro to investigate the effect of anthelmintic.[1]Inorder toProvide of three dilutions of 25,50 and 75 mg/ml of aqueous and alcoholic extract. The worms considered adjacency extract for 10 hours at 37 C°. In this study the buffer PBS as negative control and 50mg/ml dilution levamisol used as positive control. Overall 500 worms were examined. In order to data analysis, cox proportional hazards used for survival analysis.[2]The result showed that compared with levamisol 50 mg/ml, dilution 25 and 50 mg/ml there was a significant of aqueous extract of tobacco ($P > 0.05$). But in 75 mg/ml dilution of the aqueous extract and dilution of 25, 50 and 75 mg/ml alcoholic extract meaningful kind of relationship

($P \leq 0.05$).According to the above result, the dilution effect of 25 and 50 aqueous extract of tobacco plants with levamisol there is no differences and effect was the same, but other differences were found and extracts a better efficacy than levamisol 50 mg/ml.

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**ANATOMICAL, PHYSIOLOGICAL AND MORPHOLOGICAL
VARIATION OF DIFFERENT COLOCYNTH ACCESSION SEEDS**

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In order to evaluation diversity among Colocynth accession based on seed trait an experiment were conducted in completely randomized design in horticulture department of university of Tehran in 2012 year .In laboratory condition some of physiological characters such as total phenolic compound and antioxidant amount of seeds , anatomical observation of seeds and morphological characters were investigated.Result showed that seed coat layers ,phenolic compound and phenotypic characters of accession hat high diversity , maximum length and wide and maximum layer diameter and phenolic compound were observed in Khorasgan accession.Antioxidant of Kerman and Khorasgan accession revealed highest amount than others.According to this investigation seed morphological and physiological characters were more variable and good genetic resources to improve medicinal and metabolite attributes.



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**THE EFFECT OF KAEMPFEROL AND GALANGIN ON SERUM
PARAOXONASE ACTIVITY IN RATS**

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Paraoxonase (EC 3.1.8.1) is a calcium dependent enzyme which is related to HDL. Paraoxonase plays an important role in atherosclerotic lesion by preventing LDL from oxidation. Different antioxidants such as flavonoids affect serum paraoxonase activity. In the current study we investigated the effect of some flavonoids on serum paraoxonase activity in rats by gavage feeding of flavonoids in dose 7.5 and 15 mg/kg body weight. Group (i) received only water and ethanol 25%, group (ii) received kaempferol and ethanol 25% and group (iii) received galangin and ethanol 25%. At the end of experimental period, serum paraoxonase activity was evaluated. The results demonstrated that there was a significant relation between groups (i) and (ii) compared with control group (i). Also it was shown that kaempferol increased serum paraoxonase activity more than galangin in both dose 7.5 and 15 mg/kg body weight. This difference is probably related to the number and the location of hydroxyl groups on the flavonoids.

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**STUDY OF METHANOL EXTRACT ACTIVITY OF *CUSCUTA* SSP.
FROM ALHAJI HOSTPLANTS ON HUMAN LYMPHOCYTE CELLS**

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Cuscuta (Convolvulacea family) is a perennial parasitic herb that commonly grows on shrubs. Alhaji is one of the common host plants for *Cuscuta* in Iran. Alhaji have been used in traditional medicine to increase peripheral lymphocyte populations. The present study was carried out to investigate the effect of methanol extract of Alhaji and two *Cuscuta* species (*Cuscuta campestris* and *Cuscuta kotschyana*) on lymphocyte proliferation. The aerial part of *Cuscuta* and Alhaji were collected and deposited as voucher species in the Herbarium of Isfahan University (Iran) during the month of May, 2012. The proliferation activity was measured by MTT assay at different concentrations (2.5, 25 µg/ml). The aerial part of *Cuscuta kotschyana* extracts were found to increase peripheral lymphocyte values two times more than Alhaji extract. The aerial part of Alhaji were found to have higher proliferation effect on lymphocyte as compared with *C. campestris*. This study revealed that *Cuscuta* and Alhaji may have a great potential to be exploited for lymphocyte proliferation.



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**STUDY OF THE EFFECT OF 200 MG/KG DOSE OF SAFFRON
EXTRACT ON EOSINOPHIL CHANGES IN ENVIRONMENTAL
BLOOD CIRCULATION OF RAT'S WITH EXPERIMENTAL ASTHMA**

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Asthma is a chronic irritation disease of breath passages that leads to problems such as lung noise, hard breath and cough in which Eosinophil cells play an important part in irrigation stages such as worm pollution, parasitic infections and allergic diseases. Recent researches indicate the curing role of anti-oxidant materials in asthma. Due to its anti-oxidant role, saffron may prevent from increased free radical being effective on the treatment of disease agents. In order to investigate the effect of saffron extract on Eosinophil cells changes, 23 rat head, vistar were classified into 3 groups, i.e. control, asthma and extract-receiving asthma with 200 mg/kg dose to be tested. In order to get experimental asthma, the rats received injective/inhalation ovalbomine, while similarly the control group received saline solution. At the same time as asthma injection, the treated group received the extract for 32 days, 2 times per week. In this study, the number of Eosinophil cells in environmental blood circulation of each of the 3 groups was analyzed. The results indicate meaningful increased Eosinophil cells in environmental blood circulation of asthma group samples in comparison with the control group and also meaningful decreased number of these cells in the environmental blood circulation of the treated group with saffron extract relative to the asthma group as $P < 0.001$. In this survey, it is the antioxidant quality of saffron extract that may collect irrigation medians and free radicals being effective on Eosinophil in environmental blood circulation and decrease the disease agents.

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**THE EFFECT OF SALINITY ON SEED GERMINATION AND PLANT
GROWTH PARAMETERS OF THE VITEX OF A DRUG
(VITEX AGNUS-CASTUS)**

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Vitex with the scientific name (*Vitex agnus-castus*) belong Verbenaceae family, is a shrub to a height of 1-1.5 m, 5-3 m in diameter and canopy are naturally common in the West. An important medicinal property, it can be a stimulant for the secretion of the pituitary gland, increasing milk, and antibacterial properties and improve some gastrointestinal disturbances noted. In order to assess the plant's tolerance to salinity, seed germination and growth parameters in a completely randomized design with 8 levels of salinity (0, 25, 50, 75, 100, 125 and 150 mmol per liter) and three repeat were studies. Results showed that germination; root length and dry weight with increasing salt concentrations decrease, the plant will not tolerate the salinity more than 75 mmol/L and will cause the loss of all plantlets.



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**THE EFFECT OF THIAMETHOXAM AND PLANT EXTRACTS ON
BIOLOGICAL PARAMETERS OF *CHRYSOPERLA CARNEA*
(STEPHENS) (NEU. CHRYSOPIDAE) IN LABORATORY CONDITION**

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Present study conducted to evaluate the side effects of thiamethoxam and plant extracts; *Ferula gummosa*, *Rubiactinctorum* and *Aniethumgraveolens* on biological parameters *Chrysoperlacarnea* (Stephens) in controlled condition. 1st instars larva treated with insecticide concentrations and 750 µl/ml concentration of extracts by spray tower method. Results showed that the min developmental time (egg to adult) observed when 1st instars larva treated by *R.tinctorum* (26.26±0.156 days) and the max by thiamethoxam (35.03±1.531 days) which showed thiamethoxam has the most inhibition on 1st instars larvae stage. Also the max mean of larval duration was 19.68±1.302 for thiamethoxam and the min 10.32±0.157 for *R.tinctorum*.

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**STUDY OF COUMARIN PRECENCE AND AMOUNTS OF TOTAL
FLAVONOIDS IN YELLOW GERBERAS**

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Coumarin has clinical medical value by itself, as an edema modifier. Coumarins have shown some evidence of many biological activities, although they are approved for few medical uses as pharmaceuticals. The activity reported for coumarin and coumarins includes anti-HIV, anti-tumor, anti-hypertension, anti-arrhythmia, anti-inflammatory, anti-osteoporosis, antiseptic, and analgesic (pain relief). It is also used in the treatment of asthma [1]. Coumarin has been used in the treatment of lymph edema [2]. Although Gerbera horticultural viewpoint is just a ornamental plant, but studies have indicated some species and cultivars/varieties contains naturally occurring coumarin derivatives, so in this work, the presence of coumarin and total flavonoid percent was evaluated by HPLC analyses in four Gerbera varieties including Raider, Double Dutch, Dune, Bastion. Results showed that there were negligible amounts of coumarin in all varieties, also the most of total flavonoids amounts observed in Bastion, Raider, Double Dutch and Double Dutch 8.80, 7.36, 6.14 and 5.57 mg/100 g FW, respectively.

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**EFFECTS OF CHEMICAL SCARIFICATION AND GROWING
MEDIUM ON SEED GERMINATION AND SEEDLING PERFORMANCE
OF *MYRTUS COMMUNIS* L.**

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Myrtus communis L. or common Myrtle (Family- Myrtaceae) is an aromatic ever green perennial shrub or small tree. Different parts of the plant have been used in the food industry, folk medicine or extraction of essential oil and a wide range of biologically active compounds. The seeds of *Myrtus communis* L. show coat dormancy and do not germinate under normal conditions. In *Myrtus communis*, seed scarification with concentrated sulfuric acid, improved seed germination (Nadi et al. 2012). Rapid and uniform field emergence is an essential prerequisite to increase yield, quality and ultimately profits in crops, but, very little literature are available on the germination of scarified seeds in growth medium. The present work aimed to study the effect of different seed scarification treatments and growth media on seed germination and seedling growth of *Myrtus communis* L. The ripe seeds of *Myrtus communis* L. were collected from plants were grown in the field (Ramin Agriculture and Natural Resources University, Mollasani, Khoozestan province, south west of Iran), in November 2010. Fruit pulp was removed manually. The trial was a 4×5 factorial design fitted into a completely randomized design with four replications (fifty seed in each replication). Dry seeds were acid scarified by immersion in concentrated sulfuric acid, nitric acid or hydrochloric acid for 10 minutes. Untreated seeds (as control) were soaked in running water. The water- soaked or scarified seeds were then planted in the different growing media (perlite, vermiculite, coco peat, sand + manure, coco peat+ perlite). The data on percent germination, mean germination time, rate of germination, average root and shoot height and dry weight were recorded. Results showed that different growth media had a significant effect on seed germination indices and seedling vigor. The highest germination percent was recorded in water- soaked seeds and coco peat+ perlite followed by perlite and vermiculite. Seedling height was significantly affected by different growth media. Maximum seedling height was recorded in water soaking and coco peat+ perlite followed by vermiculite. water treated seeds had the highest shoot dry weight in coco peat+ perlite media. The coco peat+ perlite was found to be the best medium for improving seed germination and seedling growth of after water soaking of dry seeds.

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STUDY OF SHOOT DRY YIELD, MORPHOLOGICAL AND ESSENTIAL OIL CONTENT IN SIX *SATUREJA RECHINGERI* POPULATIONS GROWN IN TEHRAN, IRAN

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Satureja rechingeri (Labiatae) is described as an endemic species from Iran (Jamzad Z. 1996). In order to study of shoot dry yield, morphological and essential oil content in *Saturejarechingeri*, six populations were spaced planted using complete block design with three replications in Tehran ecological conditions in 2010. First, the seeds of populations were collected from Ilam Province in Southwest of Iran. Seeds were sown in pots and transplanting in field at 10-14 leaves stage. Plants were regularly monitored during the growing period. At full flowering stage, data were collected for plant height, stem number, canopy diameter, leaf weight and leaf length. To measure essential oil content, the samples were dried under shadow in proper temperature. In laboratory, their essential oils were extracted by the method of water distillation and essential oil yield per hectare were estimated. Results of analysis of variance showed significant differences between populations for Plant height, Stem number ($P < 0.01$) and for canopy diameter, leaf weight and essential oil content ($P < 0.05$). Accession 16 (Zarinabad) with average values of 2369 Kg/h had higher production. Population R15 (Havian) with average values of 5.49% had higher essential oil content. Total essential oils yield was positively correlated with plant height, canopy diameter, shoot dry yield, leaf length and essential oil content. Based on stepwise regression analysis as Essential oil content as dependent variable, leaf length, leaf weight, shoot dry yield and essential oil content were entered in final equation. Based on Ward cluster analysis, populations were divided into 3 groups. According to obtained results, the populations 16 and 15 were known as the best groups in terms of the highest yield and Essential oil content, respectively. Biplot axes, 1st and 2nd principles component demonstrated a good agreement between cluster and principles component analysis.

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INVESTIGATION OF METHODS FOR APPLICATION OF MEDICINAL PLANTS IN DIFFERENT AREAS AT DIFFERENT ALTITUDES OF IRAN

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Geographical medicine is defined as a science which tries to recognize efficient natural agent and climate effect in human health and disease. Also in Iran traditional medicine there are a lot of various methods for disease treatment by use of plants. Iran natural flora is very rich and wide and it is helpful for its conventional medicine methods. Some local tradition impressed by natural condition, social and cultural effects can be helpful and unique for medical application. A comprehensive social study can identify these beneficial manner and its results can be influenced in sanitary and economical programs and also in other governmental decisions.

The present research was conducted using questionnaires. In order to acquire information and know about mechanism of medicinal plant consumption, the questionnaires enquired all family members of students in Esfahan University of Technology. Sample size was decided to be 682 families, and finally, 1047 questionnaires were collected. ANOVA test was applied to analyze and compare the opinions of participating groups. Results showed that at different altitudes, different processed of plants were applied. In mountainous region, plants were used in the form of boil (44/6 percent of plants). This form of usage in the flat and plain areas was less than mountainous areas (39/8) while in these areas, using of distillate form of plants with 26/7 percent was greater than mountainous areas (20/1 percent). The foothills residents have balanced using of different forms of plant. It seems that the climate in difference altitude causes people to use different production of medicinal plants. Obviously the willing to use of warm beverage is because of cold climate while in the flat area, using of distillates is preferred. The results also showed that manufacturer of medicinal plants productions can supply the proportional and targeted production based on different climate of different altitudes.



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**EFFECT OF EXOGENOUS NITRIC OXIDE APPLICATION ON
SEED GERMINATION IMPROVEMENT OF EASTERN PURPLE
CONEFLOWER (*ECHINACEA PURPUREA* L.) UNDER SALINITY
STRESS**

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The genus *Echinacea* is a member of the Asteraceae family comprises nine species and four varieties, that are native to North America [1]. Its species are popular herbal medicine and food supplements for enhancing the immune system [2]. Albeit it has been reported that *Echinacea* genus is able to grow in wide range of climatic and edaphic conditions, but only few experimentd have been conducted to study the effect of salinity on *E. Purpurea* [3]. In this regard, to find the effect of exogenous nitric oxide (NO) application on germination improvement of purple coneflower (*Echinacea purpurea* L.) seeds under saline condition, a CRD based factorial experiment with three replications was conducted in Plant Physiology Laboratory of the Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University in 2012. The crop seeds were pre-soaked in 0.1 mM of sodium nitroprusside (SNP0.1; as nitric oxide donor) solution as well as in distilled water (SNP0; as control) for 20 h just before the onset of the experiment. Pre-treated seeds then subjected to different levels of salinity (0, 50, 75, 100, 125, 150 mM NaCl solution) to germinate. Results showed that primed seeds with NO at different salinity levels had significant effect on germination percentage and radicle length ($P<0.01$). Pre-soaked seeds in 0.1 mM of SNP that germinated in 100-150 Mm NaCl had the highest germination percentage and radicle length compared with non-primed seeds. No significant effect of SNP application was seen on other germination indices. Overall, it could be concluded that exogenous NO application on *Echinacea* seeds just before planting might improve the seed gemination nad hence emergence and the crop stablishment under saline conditions.

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**BIOTRANSFORMATION IN *ARTEMISIA AUCHERIBOISS.*
SUSPENSION CULTURE**

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Artemisia aucheri Boiss is a member of Asteraceae family. Artemisinin is the most important metabolite in several *Artemisia* spp and has anti malaria activity. Therefore, *A. aucheri* cultured cells was established and production of artemisinin via biotransformation ability were studied. Seedling was transferred on solid MS medium containing different growth regulators and callus culture was established. By transferring fresh callus on liquid MS medium suspension culture was obtained. For detection of artemisinin, dichloromethane extract of callus, suspension and seeds of the plant was analyzed by TLC and GC methods. Biotransformation was studied by feeding cholesterol, bisabolol and Artemisia ketone to suspension culture. MS medium supplemented with kinetin (0.5 mg/l), 2, 4-D (0.5 mg/l), NAA (1mg/l) and BA was suitable for establishment of callus. Light showed positive effect on callus growth. It seems that callus and suspension culture of *A. aucheri* produced artemisinin using TLC and GC analysis. Cholesterol, bisabolol and artemisia ketone feeding may not result artemisinin production. The type and ratio between growth regulators is effective on callus growth. The production of artemisinin in invitro culture of *A. aucheri* may relate to growth regulators used in the callus and suspension cultures. It seems that artemisia ketone is not suitable precursor for producing artemisinin, but to evaluate the role of cholesterol and bisabolol on artemisinin production needs further investigation.



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PHYTOCHEMICAL STUDY ON POLAR EXTRACT OF
ARTEMISIA INCANA (L.) DRUCE

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Artemisia incana (L.) Druce (Asteraceae), known as “Dermane ye deyhimi” in persian language, is one of 34 *Artemisia* species growing naturally in Iran. It grows in Arasbaran area of eastern Azarbaijan province of Iran in abundance. The dried and ground aerial parts of *A. incana* were extracted successively using *n*-hexane, dichloromethane and methanol by soxhlet extraction. Dried MeOH extract was subjected to C₁₈ Sep-Pak fractionation using a step gradient of MeOH-H₂O (1:9, 2:8, 4:6, 6:4, 8:2, 10:0). Further purification of the fractions by preparative and semi preparative reversed-phase HPLC resulted in the isolation of 4'-hydroxy-acetophenone-O-β-D-rutinoside, in addition to a coumarin glycoside, rhamnazin-3-O-β-D-rutinoside, 6-(hydroxy acetyl)-7-methoxy-2,2-dimethyl-2H-1-benzopyran, and 5-hydroxy-6,7,3',4'-tetramethoxy flavone. Structure elucidation for all of these compounds were accomplished by using various spectroscopic methods including UV, MS, ¹HNMR, ¹³CNMR, COSY and HSQC.



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**EFFECT OF HARVESTING TIME ON SECONDARY METABOLITES
OF SAFFRON**

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Saffron (*Crocus sativus* L.) is one of the highest priced spices of world and its quality depends on the concentration of three major metabolites: crocin, safranal and picrocrocin which are responsible for color, aroma and bitter taste of saffron, respectively. The use of saffron as a medicinal plant has a long history and it has been used as a sedative and analgesic in traditional medicinal preparations [1]. In order to investigate the effects of different times of flower harvest on secondary metabolites of saffron an experiment was conducted in experimental field of Malayer University based on completely randomized design (CRD) with five replications. Treatments were three stages of flower harvest (F1: harvest of closed flowers, F2: harvest of semi closed flowers and F3: harvest of fully opened flowers). After flower harvesting, the separated stigma were dried and amount of crocin, safranal and picrocrocin was determined using UV-vis spectrometric method [2]. Based on results the effect of treatments on crocin was not significant but delaying in harvest of flowers resulted in crocin depression and lowest amount of crocin measured in fully opened flowers. Safranal content of stigma significantly affected by treatments and highest amount of safranal observed in F3, whereas the lowest amount observed in F2. Effect of experimental treatments on picrocrocin also was significant and highest amount of this component observed in F2. In general delaying in harvest of flowers resulted in decreasing color and increasing saffron's aroma.

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**INSECTICIDAL ACTIVITY OF CAPSULATED TABLET FORM OF
*ARTEMISIA SIEBRION SITOPHILUS ORYZAE***

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Irregular usage of chemical insecticides affects detrimentally on both human and environment. One approach to reduce this hazard is to utilize botanical essential oils, but their low solubility in water, oxidation, and instability in counter with light, humidity and high temperature are the major practical constraints. Therefore, the use of nano-encapsulation technique in the form of tablet seem to be reasonable strategy. In this study, tablets containing of 10 ppm active ingredient of *Artemisia sieberi* Besser essential oil with exposure time of 11 days could be effective on *Sitophilus oryzae* L., one of the most serious pests of stored products. The results of the fumigant toxicity test indicated 70% and 80% mortality for *S. oryzae* within a 4 and 11 days exposure time, respectively. Overall, it seems that the findings of research could be promising to make practical use of plant essential oils in storage. As the new technology in tablet form through the control release of active ingredients, could be used in green food protection. It would be expected that these tablets be friendly with environment, do little or no harm to non-target organisms and have high power to degrade in the environment.



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**ANTI-BACTERIAL PROPERTIES OF ETHANOL EXTRACTS OF ALGAE
(*ENTREROMORPHA INTESTINALIS*, *CYTOSEIRA MYRICA*,
GRACILARIA CORTICATA) AGAINST THE BACTERIUM
SALMONELLA TYPHIMURIUM (PTCC1596)**

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Salmonella bacteria are anaerobic, Non-spore capsules are members of the family Enterobacteriaceae. *Salmonella* are everywhere there are humans as a pathogen in food is important. *Salmonella* are gram-negative bacilli are the 0.5-0.82 micron diameter and 1 to 3.5 Microns long *Salmonella* are everywhere and as a pathogen are important in the human food. The algae supply from Persian Gulf coast, and washed them with water completely free of sand and organisms to epithelium and then placed in distilled water was replaced once every few hours, this process was repeated until three replaced, then rinsed and dried in the dark, the samples were milled. Soaking with 70% alcohol extraction procedure was performed at room temperature. Isolated bacteria from institute pasteur were prepared. 0.5 Mc Farland Standard was used. Concentrations of 50, 100, 150 mg Extract in distilled water were prepared. Plates for 30 minutes before releasing there refrigerator at 4°C were used. Plates to incubation at 37°C for 24 h were transferred. Antibacterial Sensitivity test three times Repeat for each concentration performed well diffusion and disk diffusion. The diameter of inhibition were measured and expressed in millimeters. Data from each stage were averaged. Ampicillin and tetracycline Antibiotics were used as positive controls. Measuring sensitivity or resistance to haloblight bacteria in different concentrations of the extracts was determined. The highest anti-bacterial activity against the bacteria associated with brown algae *Cystoseira myrica* extract, the maximum inhibition zone diameter of the 9 mm Compared with positive control (AM = 21.83 ± 3.76, TE = 33 ± 2.8). Addition of ethanol extracts of algae (*Enteromorpha intestinalis*, *Gracilaria corticata*) without any effect on the bacterial was considered. Best Antibacterial extracts of *Cystoseira myrica* algae was probably due to hydrophobic compounds present in the extract is used against bacteria (gram-negative bacteria as well as having a channel layer of the outer membrane lipoprotein polysaccharide involved in drug trafficking, essentially the color of hydrophilic substances, are more resistant to antibiotics and detergents.



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THE ONION EFFECT ONEPISIATOMY WOUND HEALING

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Recovery from episiotomy and prevention from subsequent complications are of the main issues for parturients and obstetricians. To speed up healing betadine, traditional drugs, cooling and healing therapy had been used in the past. Today application of plants as a non- pharmaceutical method is a treatment supplement. Onion is widely used in midwifery cares to prevent episiotomy infection and to heal it. This research aims to study the effect of onion on episiotomy recovery. To do so women in their first parturition referred to Imam Khomeini's Hospital of Flavarjan in 2012 have been selected. To do the study 60 women in their first childbirth referred to Imam Khomeini's Hospital of Flavarjan for natural delivery has been selected. DoubleBlind Clinical Trial has been performed. The participants have equally been divided into experimental and control group. In seventh day after delivery onion has been administered to the experimental group once per day for an hour during a week and ineffective chamomile to the control group. Episiotomy recovery was assessed by REEDA (Redness, Edema, Ecchymosis, Discharge, and Approximation). Data has been analyzed by Independent T, Shapiro–Wilk test and Wilcoxon–Mann–Whitney Test. There has not been significant difference between experimental and control group in terms of demographic characteristics. Comparison of the REEDA (Redness, Edema, Ecchymosis, Discharge, and Approximation) scores showed that significant level of the test is less than 0.05. Accordingly, there is statistically significant difference between the two groups. In other words application of onion has reduced Redness, Edema, Ecchymosis, Discharge, and Approximation in experimental group. Application of onion speeds up episiotomy recovery. Therefore it is recommended to be administered to women having episiotomy in their first delivery.



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**EVALUATION OF PLANTING ARRANGEMENT AND STRAW
MULCH ON YIELD AND YIELD COMPONENTS OF PUMPKIN
UNDER RELAY INTERCROPPING WITH CHICKPEA**

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In order to study the effects of planting arrangement and straw mulch in relay intercropped pumpkin (*Cucurbita pepo* L.) with chickpea (*Cicer arietinum* L.), a field experiment was conducted as factorial layout based on randomized complete block design with three replications at the Agricultural Research Station, College of Agriculture, Ferdowsi University of Mashhad, during growing season of 2010-2011. Factors were five levels of arrangement plantings (monoculture of irrigated chickpea (A₁), monoculture of rainfed chickpea (A₂), monoculture of pumpkin (A₃), strip intercropping of pumpkin+ four rows of irrigated chickpea (A₄), strip intercropping of pumpkin+ four rows of rainfed chickpea (A₅)) and two levels of chickpea straws (with (B₁) and without (B₂) straw). The results showed that the planting arrangement (A₅) increased number of pod per plant, 1000-seed weight, seed yield and HI of chickpea up to 10, 4, 12 and 15% compared to A₂, respectively. A₄ enhanced 1000- seed weight and number of pod per plant of chickpea up to 9 and 8% compared to A₁, respectively. Also, the simple effect of planting arrangement was significant on fruit yield and seed number per fruit of pumpkin. A₄ and A₅ were increased pumpkin fruit yield up to 25 and 8% compared to its monoculture, respectively. Interaction effects between planting arrangement and chickpea mulch were significant on seed yield and fruit number of pumpkin. The highest seed yield and fruit number of pumpkin were observed in A₄B₁ with 882.1 kg.ha⁻¹ and 15416 No.ha⁻¹, respectively. Since, yield and yield components of chickpea increased under intercropping with pumpkin especially at rainfed conditions and quantitative characteristics of pumpkin was enhanced affected by intercropping with chickpea, it concluded that relay intercropping could be considered as a suitable approach to enhance efficient use of resources and yield based on sustainable agriculture.

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**STUDY ON THE BIOLOGICAL ACTIVITIES OF ESSENTIAL OILS IN
VITEX PSEUDO-NEGUNDO AND CALOTROPIS PERSICA**

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Vitex pseudo-negundo (VPN) and Calotropis persica (CP) are the native plants in the northeast and south of Iran. In the present study, after collecting and drying the seeds, essential oil extracted by steam distillation and then anti-microbial effects of these essential oil were investigated according to serial dilution on six microorganisms that are: *E.coli*, *Pseudomonas aerogenosa*, *Entrobacter* sp., *Entrococcus*, *Staph saprophyticus* and *Candida albicans* in test tube and then in solid medium of blood agar for 6 months with repetitions [1]. The conclusions of each six repetitions showed that minimal dilution of the essential oil which was able to control the bacterial growth was 1: 32 (on *Pseudomonas* and *E. coli* for VPN and CP, respectively) and maximal dilution is 1: 128 (on *E. coli* and *Candida albicans* for VPN) and 1: 256 (on *Entrobacter* for CP).

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**EFFECT OF CHEMICAL AND BIOLOGICAL FERTILIZERS ON
VEGETATIVE CHARACTERISTIC OF SAFFRON CORM
(*CROCUS SATIVUS L.*)**

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In order to study the effect of biological and chemical fertilizers on Vegetative Characteristic of Saffron Corm an experiment was conducted in the Torbat Heidarieh County during 2012-2011 years, complete randomized block design with four replications were applied under field condition in this experiment. Treatments included bio-fertilizer consisting 4 Kg/ha bio-sulfur and 400 Kg/ha sulfur and chemical fertilizers (Nitrogen, phosphorus and potassium respectively 50, 25 and 25 Kg/ha) and control (no fertilizer). Results indicated that effect of fertilizer treatment was significant on total weight of Corm, number and weight of Corms of more than 8 gr and weight of Corms 1-4 gram ($P < 0/01$) and total number of Corm, number of Corms 1-4 gram and number and weight of Corms of less than 1 gram ($P < 0.05$) The highest total weight of Corm, number and weight of more than 8 gram Corms was shown in bio-fertilizer treatment. The highest weight and number of 1-4 grams Corms was obtained in chemical fertilizer treatment enriched with bio-fertilizer treatment.



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**THE PHYLOGENY OF TRIBE RUMICEAE (POLYGONACEAE)
BASED ON NUCLEAR RIBOSOMAL DNA ITS SEQUENCES**

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Tribe Rumiceae belongs to Polygonoideae subfamily in the Polygonaceae family. This tribe, as circumscribed by Haraldson (1978) and Brandbyge (1993), includes four genera : *Emex*, *Oxyria*, *Rheum* and *Rumex*. *Rumex* is the largest genus in the tribe. In this study, phylogenetic analyses, based on nrDNA ITS data, were performed on 19 taxa consisting of 14 *Rumex* species, 1 species from *Oxyria*, *Emex* and *Rheum* as ingroups plus two species of *persicaria*, as outgroups. The nrDNA ITS fragment was amplified using appropriate primers by PCR and automated DNA sequencing in the cycle sequencing reaction mode. In next step, the sequences were edited and aligned with Muscle program, followed by manual adjustment. Phylogenetic analyses were performed based on the Maximum Parsimony, Bayesian and Maximum Likelihood methods, as implemented in the PAUP*, MrBayes and RAxML softwares, respectively. In the analyses, supports for clades were evaluated by posterior probability and bootstrapping. The result revealed that *Oxyria digyna* and *Rheum ribes* formed a well supported clade. All of *Rumex* species formed a large clade that *Emex spinosa* was nested to this clade. Two subgenera *Acetosa* and *Rumex* were not monophyletic. *Rumex vesicarius* and *R. Cyprius* were strongly allied taxa that *R. scutaus* was sister to them (pp=1.00, BP=90%)

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**EFFECT OF ESSENTIAL OILS TO EXTEND VASE-LIFE OF
LILIUM CUT FLOWER**

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Vase life and quality of flowers depend on the condition of plant cultivation, suitable harvest time and postharvest cares. In order to improve the quality of cut flowers, several factors such as higher water absorption, decreasing of microorganisms attack and reduction of ethylene action are effective. Application of natural materials such as essential oils and extracts are effective on decreasing of solution absorbance, fresh weight, vascular blockage and increasing of vase life and apparent quality of flowers by reduction of bacteria number in flower preservative solutions. For this purpose, an experiment was conducted with base of factorial design in arrangement of completely randomized block with four replications in Agricultural and Natural Resources Research Laboratory, located in the city of Shiraz in Fars province. In this study each of essential oils of thyme, was individually prepared as a solution in four concentrations of 0, 100, 300 and 900 mg and then *Lilium cut* flowers were treated with these compounds for 24 hour. The results showed that vase life, fresh weight and solution absorption of flowers were significantly influenced by essential oils and their different concentrations. The average vase life of flowers treated with distilled water as a control treatment was 9 days, while the average vase life of flowers treated with concentrations of 900 mg.lit⁻¹ of thyme and peppermint essential oils was 14 days. The highest fresh weight, solution absorption and apparent quality of flowers were observed at a concentration of 900 mg.lit⁻¹ treated with thyme.

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**IN VITRO ANTHELMINTIC AVTIVITY OF ARTEMISIA SANTOLINA
AGAINST HAEMONCHUS CONTORTUS**

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This paper describes anthelmintic aqueous and alcoholic extract of *Artemisia santolina* against of haemonchus controtus. This parasite is the most important nematode among sheep and goats. Haemonchosis which can lead to normocytic, hypochromic anemia and weight loss or decreased weight gain. For treatment this parasite used chemical drugs such as levamisole. *A. santolina* plant has santolin material that is effects antiparasitic. Therefore, decided in vitro to investigate the effect of anthelminithic [1]. In order to provide of three dilution of 25, 50 and 75 mg/ml of aqueous and alcoholic extract. The worms considered adjacency extract for 10 hours at 37 c°. In this study the buffer PBS as negative control and 50mg/ml dilution levamisole used as positive control. Overall 500 worms were examined. In order to data analysis, cox proportional hazards used for survival analysis [2]. The result showed that compared with levamisol 50 mg/ml, dilution 75 mg/ml there was a significant of aqueous extract of *A. santolina* ($P > 0.05$). But in other dilution of the aqueous extract and alcoholic extract meaningful kind of relationship ($P \leq 0.05$). According to the above result, the dilution effect of 75mg/ml aqueous extract of *A. santolina* plants with levamisol there is no differences and effect was the same, but other differences were found and extracts a better efficacy than levamisol 50 mg/ml.



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EFFECTS OF DIFFERENT MANGANESE TREATMENTS ON SOME MORPHOLOGICAL PARAMETERS OF *CUMINUM CYMINUM* L.

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Cumin (*Cuminum cyminum*) is of the family Apiaceae, has been used as a spice since ancient times. In traditional medicine, cumin has varied uses and today it is used as a stimulant, an antispasmodic and a carminative [1]. Manganese (Mn), an essential trace element for plant systems, plays an important role in several physiological processes as almost every compartment of the cell carries at least one enzyme whose activity is dependent on Mn^{+2} [2]. Many investigators have confirmed the role of elements on growth and yield of many aromatic and medicinal plants. In this study seeds of cumin were placed on water flow for 12 to 15 h. Then, they were surface sterilized and transferred to plastic pots containing peat moss under equal greenhouse conditions. The plants were sprayed with four different of Mn concentrations (0, 40, 80 and 160 ppm) by two methods: 1- Late stage of vegetative phase, 2- Both late stages of vegetative and blooming phases. Data indicated that applying of 40 ppm concentration of Mn on blooming phase significantly enhanced fresh and dry weight of the plants. The highest number of the flowers and maximum fruits weight were observed on the two times treated plants with 160 ppm and 40 ppm, respectively. The Mn treatments did not increase significantly plant height, number of umbels and fruits per plants.

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**EFFECT OF FERMENTATION AND INORGANIC ACIDS TREATMENTS
ON REMOVING MUCILAGE LAYER OF *CORDIA MYXA* SEEDS**

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As removing mucilage layer of seeds in some fleshy fruits are difficult and time-consuming, fermentation or acid treatment are recommended for seed separation from fruit. The main objective of this study was to evaluate some of the available methods of removing of mucilage layer to improve *Cordia myxa* seed quality and seedling emergence. In present study, the mucilage layer of *Cordia myxa* seeds were removed by three methods (fermentation, inorganic acids or potassium hydroxide). Seeds (with surrounding mucilage) were removed manually from ripe fruits of *Cordia myxa* and immediately fermented for 1, 2 or 3 days or treated for 10 minutes with 2.5, 5, 7.5 and 10% (V/W) Potassium hydroxide, concentrated Sulfuric acid, Nitric acid or Hydrochloric acid. Treated seeds subsequently washed and dried. Assessment of mucilage layer showed that fermentation or potassium hydroxide extraction methods did not significantly affect mucilage layer of seeds, but the application of Sulfuric acid or Hydrochloric acid were more effective. Concentrated Sulfuric acid (5% V/W after 5 or 7.5 minutes) gave the maximum seed yield, followed by HCl (5% V/W after 7.5 minutes). The surface color of seed was affected significantly by either fermentation or chemicals, but was improved after seed treating with H₂SO₄. Acid. Application of Sulfuric acid, Nitric acid or Hydrochloric acid had no significant effects on seed germination (as determined by field experiment) but assessment of seedling height, stem diameter, leaf area showed that only application of H₂SO₄ for removing mucilage layer of *Cordia myxa* seeds significantly increased seedling growth although germination percentage was not affected. The results of this study showed that concentrated sulfuric acid was the best method for removing mucilage layer of *Cordia myxa* seeds, especially for bulk of seeds to be used for seedling production.



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A NEW COUMARIN ESTER FROM *FERULA PERSICA* ROOTS

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The genus *Ferula* (Apiaceae) is represented by more than 150 species and members of this genus are widespread throughout central Asia. *Ferula persica* is a perennial herb indigenous to Iran, distributed in the different parts of the country and it used at traditional medicine. In the present research, powdered dry roots of the plant (150gr) were extracted using soxhlet apparatus with *n*-hexane, dichloromethane and methanol, respectively. The *n*-hexane extract were concentrated and fractioned with vacuum layer chromatography (VLC) and 20% *n*-hexane fraction was study by preparative thin layer chromatography (PTLC). 88% chloroform:12%acetone was used as solvent system in PTLC. The TLC analysis was showed a band with R_f value of 3/15 and blue florescent. By using conventional spectroscopy methods, the compound was identified as 7-O-(4',8',12' three hydroxy-4',8',12'-three methyl-three decanoil)-coumarin and its molecular weight was determined 448.

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**PHYTOCHEMICAL INVESTIGATION OF
ACANTHOLIMON COLLARE PLANT MEY NATIVE OF SOUTH
KHORASAN PROVINCE**

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Plant is man's friend in survival, giving him food and fuel and medicine from the days beyond drawn of civilization. Plant continue to be a major source of medicine, as they have throughout human history. The plant *Acantholimoncollare* a member of Plumbaginaceae family, Mey native of south khorasan province. The investigation was carried out to determine the qualitative analysis of phytochemical screening and possible chemical components *A.collare*.

Chemical test were carried out on the methanol extract and on the powdered specimens using standard procedures to identify the constituents as described by Sofowara, Trease and Evans and Harbone. *A.collare* contained flavonoids, Steroid, Terpenoids, Saponins, alkaloids and tannins. The table shows the results of the flower and leaf contain the highest amounts of secondary metabolites. It was found that due to secondary active compounds including tannins possess antimicrobial property significantly. so it can be used in pharmaceutical industries.

Qualitative analysis of the phytochemical screening of all plant organs *A. collare*

<i>Steroid</i>	<i>Terpenoids</i>	<i>Proteins</i>	<i>Tanins</i>	<i>Saponins</i>	<i>Flavonoids</i>	<i>Alkaloids</i>	
+	+	-	++	+	+	+	<i>Root</i>
+	+	-	++	++	+	+	<i>Flower</i>
+	+	+	++	+	+	+	<i>Leaf</i>
+	+	-	++	+	+	+	<i>Stem</i>

++ = Abundant, + = trace and - = absent.



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**THE EFFECT OF LAVENDER ETHANOLIC EXTRACT ON LEARNING
AND MEMORY IN RAT**

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Lavandula officinalis (Lamiaceae), commonly known in Iran as “Ostokhoddous”, is a widely distribute aromatic herb. *Lavandula officinalis* is well known among people as a powerful aromatic and medicinal herb. The plant is used in traditional and folk medicines of different parts of the world for the treatment of several gastrointestinal, nervous and rheumatic disorders. In pharmacological and biological tests, extracts, fractions, and essential oil of *Lavandula officinalis* are reported to have CNS-depressant, anti-convulsive, sedative, spasmolytic, local anaesthetic, antioxidant, anti-bacterial and mast cell degranulation inhibitory effects[1]. The main constituents of lavender oil are linalool, linalyl acetate, cineole, terpinen-4-ol and camphor [2]. This study investigated that the effects of Lavender ethanolic extract on spatial memory and learning in rat.

The control group received distilled water while three treatment groups received oral lavender extract for 25 days (100, 200, 400 mg/kg respectively) and 2 h after the last gavage behavioral test were performed. Behavioral test was performed with morris water maze. A circular water tank, made from galvanized steel that was covered by a layer of black plastic (diameter, 183 cm; height, 60 cm) was filled with water (24 °C). Four positions, 90° apart, around the edge of the tank were designated north (N), south (S), east (E), and west (W); this provided four alternative start positions and also defined the division of the tank into four quadrants: NE, SE, SW, and NW. The platform is hidden halfway between the side-walls and the center of the pool in one of the quadrants following a counterbalanced paradigm within groups. A video camera was fixed 1.4 m above the center of the water tank, and all swimming trials were recorded. Treatment groups with Lavender ethanolic extract improved learning and memory in experimental groups compared with the control group. *Lavandula officinalis* extract improves spatial memory and learning is partly associated with the antioxidant properties.



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**ESSENTIAL OIL CONSTITUENTS OF SEVERAL ORGANS OF
FENNEL (*FOENICULUM VULGARE* VAR. *VULGARE*) UNDER AHWAZ
CLIMATIC CONDITION**

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Fennel (*Foeniculum vulgare*) is a member of the Apiaceae family. It is a Biennial, umbelliferous herb, with yellow flowers. It is indigenous to the shores of the Mediterranean but has become widely distributed in many parts of the world. It is a highly aromatic and flavorful herb with culinary and medicinal uses. Several components of the essential oil from this plant have important applications, namely, fenchone is used as counterirritant; limonene is used as solvent, resins, wetting and dispersing agent, etc. Therefore, other parts of this plant including stems, leaves, flowers bud, inflorescences also produce different amounts of essential oils with profitable attention. An experiment was carried out at the medicinal plants farm of the Ramin University of Agriculture and Natural Resources located in Molasani, Ahvaz, Iran at an altitude of 24 meter above sea level. The sampling design used was completely randomized block with 3 replications and 7 treatments. The treatments were different harvest times. The sowing date was autumn of 2011 (November 13 th) and harvested every 28 days, until the complete maturation during one year (total of five harvests). The results presented the maximum rate of limonene (41.88%) in spring in stems/leaves, trans-anethole (77.98%) during the summer in dry seeds, and fenchone (17.12%) in green seeds in autumn. In conclusion, the most excellent period for growing fennel to achieve the compound *Trans-anethole* in dry seeds was the Summer; for *limonene* in stems/leaves was the Spring, and *Fenchone* in green seeds in Autumn and followed of the Summer.



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THE EFFECT OF WATER DEFICIT STRESS ON GERANIAL AND METHYL CHAVICOL AS MAIN COMPOUNDS OF ESSENTIAL OILS IN THREE ECOTYPES OF BASIL (*OCIMUM BASILICUM* L.)

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Effective irrigation management in arid and semi-arid regions, like Iran, is very important. In this study, three ecotypes of *Ocimum basilicum* L. (Esfahan, Karaj and Shoshtar) were grown under three watering regimes (30, 60 and 90% field capacity) in Research Institute of Forest and Rangelands (RIFR) in 2011. The chemical composition of flowering branches has been examined by GC and GC-MS. Two main compounds of essential oils were methyl chavicol and geranial. Results showed that there was a significant difference in interaction between populations and different levels of drought stress on methyl chavicol and geranial. Water stress increased percentage of methyl chavicol. By contrast geranial percentage was significantly reduced by water stress. The highest percentage of methyl chavicol with mean 74.33% was branch of the Karaj population under severe moisture stress condition (30% FC) [1,2].

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**PHENOLIC COMPOUNDS FROM TWO CULTIVARS OF OLIVE
LEAVES COLLECTED IN TAROM AND RUDBAR AND EFFECT OF
HARVESTING TIMES IN GOLESTAN PROVINCE**

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Olive has an important place in the Mediterranean diet because of its physiologically active polyphenols. Olive leaf extract has also been used by native people of these areas in folk medicine. This property can be linked to the fact that the leaves are rich in polyphenols, especially in oleuropein[1]. Oleuropein, the major active compound in olive leaf, is well known for its benefits for human health[2]. The concentration of polyphenolic compounds in olive leaf changes depending on the quality, origin and variety of the plant material[1]. The total phenolics and oleuropein from 2 cultivars of olive leaves (Zard, Koroneiki) in Tarom and Rudbar and also from 2 other cultivars of olive leaves (Roghani, Manzanilla) harvested in three different times (fall, winter, spring) in Gorgan were determined by high performance chromatography and Folincioaltea's method. The results showed that cultivar Zard of olive leaves from Rudbar had the highest oleuropein and total phenolic (10.497mg/g, 34.85mg/g) content and cultivar Roghani of olive leaves in winter had the highest oleuropein (12.177mg/g) content and cultivar Manzanilla in winter had the highest total phenolic (36 mg/g) content.

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**STUDY OF CHEMICAL PROFILE OF ANTHOCYANINS AS A PART
OF INFLUENTIAL COMPOUNDS IN PURPLE – BLUE FLOWERS OF
*CENTAUREA CYANUS***

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Anthocyanins are the chemical components that give the intense color to many flowers and fruits. Epidemiological investigations have indicated that the moderate consumption of anthocyanin products is associated with a lower risk of cardiovascular disease and improvement of visual functions. Recently, there is increasing interest in the pharmaceutical function of anthocyanins due to aspects: 1) the antioxidation, 2) anticarcinogenesis and 3) the apoptosis induction of tumor cells. Cornflower (*Centaurea cyanus*) is considered a weed in fields. However, it is also used as an ornamental flower because of its intense blue flowers, and has become naturalized in many countries. Blue cornflower has been used to flavor teas and to reduce ocular inflammation. Some preliminary studies indicate that cornflower may have anti-inflammatory properties, and blue cornflower did reduce the recurrence of urinary tract stones in one clinical trial. However, high-quality clinical studies need to be conducted before blue cornflower can be recommended for any use.

In this study, chemical profile of anthocyanins including Cyanidin, Cyanidin 3-glucoside and Cyanidin 3,5- diglucoside and total anthocyanin amounts analysed in flowers of *Centaurea* that was collected from some regions of Tehran and Semnan province. The major type of anthocyanins and its concentration in flowers were 3,5-di glucoside and 16.76 mg/100g (51.9 % of total anthocyanin amounts) fresh weight, respectively. Also the most of total anthocyanin amounts determined 32.29 mg/100g FW in flowers extracts.

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**THE EFFECTS OF DRYING METHODS ON ESSENTIAL OIL
CONTENT AND APPEARANCE CHARACTERISTICS OF
THYMUS VULGARIS, *HYSSOPUS OFFICINALIS L.* AND *LAVANDULA
ANGUSTIFOLIA***

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Essential oil and members of medicinal plants are abundant using for Pharmacy, food and hygienic industries. Drying as one of the pre-processing methods of medicinal plants after harvest plays an important role. To determine the effect of different drying methods on drying time, essential oil content and appearance characteristics, the experiment was carried out on three medicinal plants at a randomized complete block design as a factorial experiment with three replications. So, three different oven temperature (30, 45 and 60°C), drying in shadow and under the sun light for *Thymus vulgaris*, *Hyssopus officinalis L.* and *Lavandula angustifolia* were compared. The drying process was continued until the mass of the sample reduced to a moisture content of about 0.10 on a dry weight basis. After drying the samples, their essential oils were obtained by water distillation. Results indicated that different treatments of drying method had significant effects on drying time, essential oil content, final moisture and appearance characteristics. For appearance characteristics, results show that for each plant, best quality obtained in shadow drying and oven-dried 30°C. The minimum essential oil content obtained at sun light drying for *Hyssopus officinalis L.* and the maximum essential oil content obtained for *Lavandula angustifolia* at oven-dried 30°C and for *Thymus vulgaris* at oven-dried 45°C. Also, the lowest time of drying (32 Hours for *Hyssopus officinalis L.* and *Thymus vulgaris*, and 37 hours for *Lavandula angustifolia*) obtained from oven-dried 60°C.

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**COMPARISON OF PHENOLIC COMPOUNDS AND ANTIOXIDANT
ACTIVITY OF 6 MEDICINAL PASTURE PLANTS IN METHANOL AND
ETHANOL EXTRACTS BY HPLC AND SPECTROPHOTOMETRY**

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Free radicals cause harmful damages in human being. Antioxidants are used as treatments for stroke and neurodegenerative diseases. Synthetic antioxidants are unsafe and because of their toxicity and carcinogenicity, in recent years considerable attention has been directed towards the identification of natural antioxidants from plants. [1,2]. Some natural antioxidants and free radical scavengers have been found in dietary sources like plants, fruit and vegetables. This study focused on evaluation of antioxidant activity of methanol extract (ME) and ethanol extract (EE) of both shoot and root parts of 6 medicinal plants used by most Iranian people as food supplements. Introduction of the best alcohol for extraction to get more phenolic content was determined. The range of antioxidant activity among the studied plants was from 14.34 $\mu\text{g/ml}$ in the ME of *Acanthus* to 194.11 $\mu\text{g/ml}$ in the ME of *fennel* expressed as IC₅₀. The results of phenolic content were expressed in terms of Gallic acid equivalents/100 g plant powder varied from 78.22 in the EE of to 820.15 in the ME of *Sourdock*. The ME is the best way of extraction in each plant. The results showed that, there was no correlation between antioxidant activity and phenolic content of the plants, so phenolic content cannot be a good indicator of antioxidant activity.

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**DRUG EFFECTS OF ARTEMISIA PLANT ESSENTIAL OIL ON SOME
DERMATO INFECTIOUS BACTERIA**

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Increasing of drug resistant in bacteria and side effects of synthetic drug are main problem of treatment of disease with synthetic .Therefore, today usage of herbal plant for fight disease increased. In this study the antibacterial effects of essential oil of Artemisia on two types of gram-positive bacteria including Staphylococcus aureus, Strep, Enetrococcus fecalis and gram negative bacteria such as Escherichia coli, Salmonella typhi, Pseudomonas aeruginosa and Klebsiella pneumonia with Disk diffusion method on Mueller Hinton agar medium, was evaluated. The oil in concentrations, 50, 75, and 100 percent prepared in DMSO and then 50 micro liters amount per each concentration was added to the specified disks. The results of this study revealed that Artemisia oil has a good antibacterial activity against Gram positive bacteria are studied, but with the exception Escherichia coli and Klebsiella Pneumonia on other gram-negative bacteria studied were ineffective.



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CHEMICAL ANALYSIS OF THE ESSENTIAL OIL OF TWO MENTHA SPECIES (*MENTHA AQUATICA* AND *MENTHA SPICATA*) AND EVALUATION OF THE ANTIOXIDANT ACTIVITIES AND ANTIMICROBIAL ACTIVITIES

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The essential oil of two genus of *Mentha* (*Spicata* and *Aquatica*) is extracted by common and *Soxhlet* extraction procedure. In this study the chemical compounds in the essential oil of the two genus of *Mentha* are analyzed by GC-MS method via head space. The antioxidant and antibacterial properties of the *Mentha* extract were investigated. The total *Phenolic* constituent, total *Flavonoids* and the chelating effect of the extract on Fe (II) ion and effect of DPPH were determined. The main reagents in the essential oil are *Carvone*, *Limonene*, *Cineole*, *Menthol*, and *Pulegone*. The results showed that the plants that collect in the higher mountain have more essential oil than that of the other ones (plain areas). The both *Mentha* are shown the high antioxidant effect. The antibacterial properties of the extract are investigated on the both positive (*Micrococcus*, *Staphylococcus*) and negative (*Salmonella*, *E-coli*) Gram bacteria and their MIC and MBC are measured.

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**EFFECTS OF WATER DEFICIT AND PROLIN FOLIAR APPLICATION
ON MORPHOLOGICAL CHARACTERISTICS OF GERMAN
CHAMOMIL (*MATRICARIA CHAMOMILLA* L.)**

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Water deficit stress is a widespread abiotic stress that seriously affects crop production. So, increasing crop tolerance to the stress could improve crop yields. Proline is an organic compound which plays an important role in osmotic adjustment, a mechanism of plants' responses to water deficit stress. To study the effect of different levels of water deficit and proline on morphological characteristics of German chamomile, a CRD based pot factorial experiment with three replications was conducted at Faculty of Agricultural Sciences, University of Guilan, in 2012. Four levels of soil water regimes (FC, and irrigation after 25, 50, 75 percent depletion of FC level) and three levels of proline (0, 50 and 100 mg/lit) were considered as treatments. Water deficit and proline treatments were applied at stem elongation and trifoliate stages, respectively. Results indicated that flower number per plant, flower dry and fresh weight, and flowering branches were affected by water deficit by proline interaction while plant height and stem diameter were just affected by water deficit and proline. Overall, it could be concluded that proline foliar application can modify the adverse effect of water deficit.



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INVESTIGATING THE EFFECTS OF THE CHEMICAL-PHYSICAL PROPERTIES ON THE PERFORMANCE AND COMPOSITION OF ESSENTIAL IN THE *STACHYS LAVANDULIFOLIA*. VAHL

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The growth and performance of plants in ecosystems are effected by the different abiotic factors, such as the regional climate and soil [3] so that the chemical-physical soil properties have a considerable effect on a limited scale. Such effects bring about changes in the performance of the crops, influencing the quantity and quality of their active substances as well [5]. Therefore, the knowledge of the quality of the soil is regarded as a significant force in the variations of the active substances in the herbs, which requires more studies in a variety of contexts [4]. The present study attempts to investigate the effect of the soil properties on the performance and components of the essential in the herb *Stachys Lavandulifolia*, which is a tribe of *Labiataea* used in the folk and modern medicines [2] at three altitudes of Baladeh, Noor. The aerial parts of the herb were collected in the blossoming stage and dried in lab temperature, and then the essential was extracted through Hydrodistillation. The analysis and identification of the essential components were performed using the GC and GC/MS devices, to measure the Retention Index and to investigate the germic gamuts [1]. To compare the extracts from three altitudes, the ANOVA of the data was carried out using the SPSS (version 17) and the Duncan Test. Additionally, the Pearson Correlation Coefficient was used to determine the correlation between the chemical soil properties and the essential output as well as the active substances obtained in the *Stachys Lavandulifolia* at three altitudes. The results indicated that the soil texture at the altitudes of 1600, 2400, and 3200m was silty, silty-loamy, and loamy-silty, respectively. Moreover, the essential output means were 0.77%, 0.61%, and 0.69%, respectively, so that the highest amount of output in the herb (0.77%) was found to be in the altitude of 1600m with silty texture, and the smallest amount (0.61%) was reported to be in the altitude of 2400m with silty-loamy soil. On the other hand, there was a negative correlation between the essential output and the soil constituents other than the pH of the soil. The results also showed that the highest amount of Alpha-Pinene, Beta-Myrcene, and Hexadecanoicacid was observed in the silty soil, while the highest amount of Beta-Phellandrene and Beta-Pinene was extracted in the silty-loamy, including the fact that GermacreneD in the loamy-silty texture revealed the highest amount. In contrast, there was a significantly positive correlation between Alpha-Pinene and Mg of the soil ($p>0.05$), whereas the correlation between Hexadecanoicacid and K, P, N, Ca, CaCO₃, and pH of the soil was statistically negative. The comparison of the primary essential compounds in the studied population indicated that the difference in species and essential components of the herb rested in the effects of different climatic and soil factors.



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**CYTOTOXIC EVALUATION OF *HAPLOPHYLLUM ROBUSTUM*
AGAINST HELA CELLS**

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Haplophyllum robustum (Rutaceae) is a perennial herb, which is native to Iran [1]. The plant is distributed from central to southeastern parts of Iran. The Persian name of this plant is "Sodabi" [2]. The present study is focused on the cytotoxic activity of methanolic extract that was isolated from dried aerial parts of the plant. *H. robustum* plants gathered from Semnan province and dried at room temperature. Aerial parts of dried plants extracted three times with 2500 mL of methanol for 24 h. The methanolic extract was partitioned sequentially between Et₂O, CH₂Cl₂, *n*-butanol and water. The cytotoxic properties of the isolated partitions were examined against HeLa cells using the WST-1 assay. All results were expressed as IC₅₀ values (the concentration of extract that inhibited cell proliferation up to 50% of the negative control) [3]. Results showed that Et₂O extract had the highest cytotoxic effect on this cancerous cell line.

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**EFFECT OF DIFFERENT LEVELS OF NITROGEN AND WATER
DEFICIT ON MORPHOLOGICAL CHARACTERISTICS AND
ANTIOXIDATIVE ENZYMES OF POT MARIGOLD
(*CALENDULA OFFICINALIS* L)**

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In order to study the effect of different levels of nitrogen and water deficit stress on morphological characteristics and antioxidant enzymes in pot marigold (*Calendula officinalis* L), a CRD based factorial pot experiment with three replications was conducted at Faculty of Agricultural Sciences, University of Guilan, in 2012. Five amounts of nitrogen (0, 15, 30, 45, 60 kg N/ha) and four levels of soil water regimes (FC, 25, 50, 75 percent discharge from FC) were considered as treatments. Plant heights, diameter of main stem, number of branches as well as catalase and peroxidase activity were measured. Results represented that water deficit had significant effect ($P \leq 0.01$) on plant height, diameter of main stem and number of branches while nitrogen had significant effect just on branch numbers ($P \leq 0.05$). Nitrogen by water deficit interaction was significant for all of measured characteristics. Results revealed that water deficit significantly decreased plant height, main stem diameter and branch numbers while it increased the antioxidant enzymes with the highest amount in the driest treatment. Results also indicated that application of 60 kg/ha nitrogen resulted to highest amount of catalase and peroxidase. Overall, it could be concluded that higher amount of nitrogen fertilizer and drier condition may improve the plant performance through increased levels of antioxidant enzymes.



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OPTIMIZATION OF PLANT CELL SUSPENSION CULTURES OF
GARLIC (*ALLIUM SATIVUM*)

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Garlic (*Allium sativum* L.) is one of the most important herbs throughout the world [1]. Allicin is the major metabolite of garlic and is responsible for a wide variety of biological activities such as anti-clotting drugs, heavy metal detoxification, reducing fat and strengthening immunity. Since cell suspension cultures are widely used for production of valuable secondary metabolites in many plants [2], optimizing garlic cell suspension culture with the aim of best hormone concentration in order to produce high biomass in best time was carried out [5]. In this study, callus induced from Garlic leaf was used in MS liquid medium supplemented with 18 different hormone treatments containing 2, 4-D, NAA, KIN and their interactions [3,4]. All treatments were incubated under the same temperature condition in complete darkness during 52 days. Sampling time was 13, 26, 39 and 52 days after initiation time. Our results showed that compared to control, hormonal treatments of NAA (25 µM) + KIN (1 µM), NAA (5 µM) + KIN (10 µM) and NAA (25 µM) + KIN (10 µM) at sampling time of 13, 26 and 39 days had the highest dry/fresh weight with means of (26/187 mg, 70/231 mg, 116/335 mg), respectively. Since more fresh and dry weight in shortest time were produced in treatment of NAA (5 µM) + KIN (10 µM), we suggest to use this treatment for evaluating elicitors application for production of secondary metabolites in cell suspension culture of garlic.

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**EVALUTION THE YIELD AND YIELD COMPONENTS OF CUMIN
LANDRACES (*CUMINUM CYMINUM* L.) AS AFFECTED BY THE BIO-
FERTILIZER UNDER DROUGHT STRESS**

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Environmental stresses, especially drought stress, play an important role in reduction of plant growth stages and seed yield in arid and semi arid regions. Production of this plant is limited due to several biotic stresses of which wilt diseases is the most serious. In order to evaluate the effect of seed inoculation by *Azotobacter* and *azospirillum* on yield and yield components of cumin (*Cuminum cyminum*) was studied in experiment farm of Kerman University during 2011 growing season. The experimental was a split-plot design based on randomized complete bloke (RCBD) with three replicates. bio-fertilizer in four levels (Control, *Azospirillum*, *Azotobacter*, and *Azospirillum* + *Azotobacter*), drought stress in three levels normal (control), moderate (50% FC) and high (25% FC) with cumin landrace in two levels (Bardsir and Ravar) were assigned in plots. Results showed that traits plant height, number of branch per plant, number of seed per umbels, number of umbels per plant, seed weight per plant, 1000-seed weight, grain and biological yield significantly affected by drought stress. Grain yield 34.41% decreased under drought stress. Fertilizer effect and landrace and bio-fertilizers interaction were not significant on any of traits. There were a different significant among lines in number of umbel per plant, umbel seed per plant, seed weight per plant and 1000-seed weight. Interaction effect of landrace and bio-fertilizers had a significant effect on plant height, stem diameter, number of branch per plant, number of sub umbels per umbels, number of seed per umbels, 1000- seed weight and biological yield. Triple interactions showed significant difference on number of branch per plant, number of umbels per plant, seed weight per plant, number of seed per plant and number of seed per umbels. The maximum grain yield 303.67 kg/ha was obtained of *Azospirillum* treatment and Ravar landrace in normal condition. Data correlations in normal and stress condition showed, between grain yield and stem diameter, number of branch per plant and number of umbels per plant were positively significant in both (normal and stress) conditions. Among these microbial groups bacteria and arbuscular mycorrhizal (AM) fungi are ubiquitous in the soil, and there is abundant literature to support the idea that these rhizosphere microbes interact in rather specific ways to influence their relationship with and their effect on plant growth.



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**INVESTIGATING THE EFFECTS OF THE CHEMICAL-PHYSICAL
PROPERTIES ON THE PERFORMANCE AND COMPOSITION OF
ESSENTIAL IN THE *TANACETUM POLYCEPHALUM SCHULTZ-BIP.*
*POLYCEPHALUM***

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The growth and performance of plants in ecosystems are influenced by different factors, such as species, regional climate, and soil [2] and one of the significant factors is the chemical-physical properties of soil. Capable of affecting the growth and production of the herbs, these factors normally create changes in the performance of the product, having impact on the quality and quantity of their active substances as well [5]. Therefore, the knowledge of the elements influencing the quality and quantity of the herbs and the greater effectivity of the quality of active substances, especially on time of harvesting the herbs, should be taken into account in order to make the best of the potentiality of the soil organism and organic matters to maximize the products while allowing for the soil quality and maintaining the health and safety of the environment at the same time [3]. The herb *Tanacetum polycephalum* is a subgenus of *Tanacetum* and a subfamily of Composites, which is widely used in folk and modern medicines [4]. The purpose of the present study is to investigate the effects of the soil properties on the performance and components of the essential in the *Tanacetum polycephalum* at three altitudes of Baladeh, Noor. The aerial parts of the herb were collected in the blossoming stage and dried in lab temperature, and then the essential was extracted through Hydrodistillation. The analysis and identification of the essential components were performed using the GC and GC/MS instruments, to measure the Retention Index and to investigate the germic gamuts [1]. To compare the extracts from three altitudes, the ANOVA of the obtained data was carried out using the SPSS (ver. 17) and the Duncan Test. Additionally, the Pearson Correlation Coefficient was employed to determine the correlation between the chemical soil properties and the essential output as well as the active substances obtained in the *Tanacetum polycephalum* at three altitudes. The results showed that the soil texture at the altitudes of 1600, 2400, and 3200m was silty, silty-loamy, and loamy-silty, respectively. Likewise, the means of the essential output were 0.74%, 1.09%, and 1.32%, respectively, so that the highest amount of output in the herb (1.32%) was found to be in the altitude of 3200m with loamy-silty texture, and the smallest amount (0.74%) was reported to be in the altitude of 1600m with silty soil. On the other side, there was a positive correlation between the essential output and the soil constituents other than the Mg, pH, and EC of the soil. The results also revealed that the highest amount of 1,8-Cineole, Camphen, and Alpha-Pinene was recorded in the silty soil, whereas the highest amount of Santolina triene was observed in the silty-loamy soil. In contrast, there was a significant correlation between 1,8-Cineole, K, Tre-penine-4-l and pH of the soil ($p>0.05$), while the correlation between Alpha-Pinene and all other components in the soil other than Ca, CaCO₃, and pH was statistically negative. The comparison of the primary essential compounds in the studied population implied that the difference in species and essential components of the herb could be sought in the effects of different climatic and soil factors.



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SEED GERMINATION IN ALDERBUCKTHORN
(FRANGULA ALNUS MILL)

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Alder buckthorn (*Frangula alnus* Mill) as a medicinal species from Rhamnaceae is a perennial shrub plant that grows in moist forests in north region of Iran. Stem bark is smooth, dark color and has antraglicoside ingredients. The seeds of this plant have physical, Physiological and chemical dormancy and face extinction. In this study, The seeds of Alderbuckthorn plant TTC and leaching tests were disinfected in 5 different soil formula (sand, clay, humus, decayed manure and clay mixture, the mixture of clay and sand and humus) in two different climates: 1. plant origin (forest) at an altitude of 1033 meters above sea level 2. region (plains) at altitude of 46 meters above sea level and have studied .Based on the results of germination after 7 months at the height of 1033 meters above sea level in plant origin maximum average 57.7 and in humus soil minimum average was 22.2 %. while the germination in plane region at the height of 46 meter above sea level maximum in clay soil 41.1% and minimum average was in sand 5.56%.



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**INTRODUCING THE FLORA AND CHOROLOGY MEDICINAL
PLANTS IN SUMMER RANGELANDS OF SARI**

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This area is situated 125 km to the south of Sari. It covers an area of 2413 hectar. The lowest altitude is 1700m and the highest altitude is 2600m. The aim of this research was to identify the plant species, introducing the flora, determination of life forms and geographical distribution in summer rangelands area. For this purpose, plant samples were collected from different parts of the area during two growing seasons between 2003-2004 years. The biological spectrum of the area was plotted by means of life forms results. The position of summer rangelands area within Iran's phytogeography classification was studied based on geographical distribution data and references. From a total of 167 species, 3 fern, 3 gymnosperms, 139 dicotyledones and 33 monocotyledones were identified. Among the 48 families represented in the area, the following had the highest number of species: Asteraceae, Lamiaceae, Rosaceae, Poaceae and Fabaceae. The distribution of 66 species (39.52) is restricted to Irano-Turanian region. Of these, 15 species (8.92) are endemics of Iran. 80 percent of the endemics restricted to Irano-Turanian region and 20 percent restricted to Euro-Siberian region. Hemicryptophytes with 76 species (45.5) are the most frequent life form of the area.



**EFFECT OF BIOLOGICAL AND CHEMICAL FERTILIZERS ON
MORPHOLOGY, YIELD AND LAND EQUIVALENT RATIO IN MIXED
CROPPING OF ALFALFA AND FENNEL**

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To investigate the effect of fertilizer and cultivation alfalfa and fennel in mixed cropping, an experiment was designed in split plot based on randomized complete block with three replications at the Research Field of Shahed University. Fertilizer as the main plot in two levels: (Triple superphosphate) and biofertilizer (nitroxin+ Barvar-2) +50% chemical fertilizer recommendation (Triple superphosphate) and cultivation as sub-plot consisted of four levels: sole alfalfa (100% alfalfa), sole fennel (100% fennel), alfalfa 100%+ fennel 50%, alfalfa 100%+ fennel 100%. The results showed that the maximum height of fennel was obtained in sole fennel (100% fennel). Maximum height, number of umbel and branches was obtained in biofertilizer +50% chemical fertilizer. The interaction of fertilizer and cultivation, maximum branches and number of nodes were in alfalfa 100%+ fennel 50% by applying biofertilizer +50% chemical fertilizer and alfalfa 100% + fennel 100% by applying chemical fertilizer, respectively. Also, the maximum yield of fennel was observed in sole fennel (100% fennel) by applying biofertilizer +50% chemical fertilizer and in Maximum land equivalent ratio (LER) was obtained in alfalfa 100% + fennel 100% by applying biofertilizer +50% chemical fertilizer in mixed cropping.

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**HISTOLOGICAL AND HISTOCHEMICAL STUDY AND THE EFFECT OF
FENNEL ON THE STRUCTURE OF KIDNEY IN ALLOXEN-INDUCED
DIABETIC RATS**

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Fennel is known as hypoglycemic agent, which is used in folklori medicine for improving blood glucose level and preventing long term complications in diabetes mellitus [1,2]. So this study tried to determine its role on the histological and histochemical changes in kidney and islets of Langerhan in diabetic rats. 60 rats divided into 3 groups. The first group was control. The second group containing 40 rats diabetes mellitus was induced, utilizing alloxan. The infected rats were divided into two subgroups. Subgroup 1: infected-treated rats and subgroup 2: infected-untreated rats. The rats of the second group were dosed orally by fennel for 2 weeks. Histopathological effects in kidney were massive inflammatory infiltrate in interstitial tissue, vacuolar degeneration in tubular epithelial cells, karyolysis and karyorrhexis and some glomerular degeneration. The islets of Langerhan showed severe necrotic changes of pancreatic islets, especially in the center. relative reduction in the size of islets was seen. DNA analysis showed hypoploidy in kidney and pancreas of rats treated with alloxan only. The treatment of diabetic rats with fennel resulted in amelioration of histopathological and histochemical changes in kidney and islets of Langerhans.

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MEDICINAL PLANT AND RESISTIVE ECONOMY

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Historical experience shows that models of economic growth have been started mainly, with simple analysis that only emphasized on production factors of labor, capital and intermediate inputs are stressed, nowadays some other aspects of growth source with have soft trait are emphasized. Among these factors, the productivity, saved knowledge, human capital, research and development of social capital could be mentioned. Today, improving efficiency of total factor productivity should be considered as the most effective method to achieve economic growth. Brdramdhay rest of the economy and its effects on oil revenues of economic and political issues, the economy is vulnerable. One way to address this challenge, developing products that improve the domestic economy will increase non-oil exports. In trying economic circumstances that the medications are manufactured in countries that produce more income. Outlines the current situation in the field of drug supply And benefiting from economies of production and distribution of drug resistance is essential. Diversity of geography, climate and soil of Iran is caused .the plant species diversity and natural medical plant. So one option is sustainable development of medicinal plants and related industries. So using domestically produced herbal medicines can be effective in promoting the goals of economic self-sufficiency resistance.

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**EFFECT OF PRIMING WITH POLYETHYLEN GLYCOL AND
DROUGHT GERMINATION HERB PURSLANE
(*PORTULACA OLERACEAE L.*)**

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One way to improve germination and seedling establishment in drought conditions is seed priming. The present study was designed to investigate the effect of seed priming on the germination characteristics of purslane herb, experimental factorial arrangement based on completely randomized design with 3 replication design at the seed Lab of Ramin Agricultural Research and Natural Resources University Ahwaz during. In each petri dish 50 seeds were. Treatments included seed priming at two non-primed and primed with poly ethylene glycol 6000 for 8 hours and drought levels of 0, -3, -6, -9 and -12 bar. Salinity was created with poly ethylene glycol. The results showed that priming with poly ethylene glycol had no significant effect on germination characteristics. But germination characteristics had significant differences at -9 and -12 levels. We conclude that polyethylene glycol has no effect on germination characteristics. Also purslane germination stage the plant has a relatively tolerant to salinity.

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INVESTIGATION THE EFFECTS OF CORIANDER OIL ON WATER HOLDING CAPACITY (WHC) AND MEAT MOISTURE IN BROILER CHICKEN

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This experiment was conducted to evaluate the effects of different levels of Coriander Essential oil on water holding capacity and meat moisture in broiler chicken. The experiments were performed on 200 one-day-old chickens from Ross 308 strain in a completely random basis for 5 treatments, each consisting of 4 replicates with 10 broiler chickens. The treatments include a control treatment (basal diet), three treatments with basal diets and different levels of dietary Coriander oil (100, 200, and 300 ppm added to feed), and finally one treatment with 10 ppm antibiotic Virginiamycin. Water holding capacity and meat moisture of breast and thigh meat were measured at 42 days of age. The results of these experiment indicated that Coriander essential oil at level 200 and 300 ppm tended to significant increase in water holding capacity breast and thigh meat and breast meat moisture in compared to the control group ($p < 0.05$), but, not significant on thigh meat moisture in broiler chicken ($p > 0.05$). According to the results of these trial can be concluded that the use of Coriander oil caused increase water holding capacity breast and thigh meat broilers chicken.

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**THE EFFECT OF *SALVIA OFFICINALIS* ON MALONDIALDEHYDE
LEVEL OF BRAIN TISSUE IN STREPTOZOTOCIN INDUCED
DIABETIC RATS**

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Diabetes mellitus type one (DMT1) is accompanied with enhanced oxidative stress and lipid peroxidation. One of the most markers of lipid peroxidation is tissue level of malondialdehyde (MDA). Due to significant role of enhanced oxidative stress in development of cerebral damage in diabetics and anti-oxidative effect of *Salvia officinalis* (SO) mentioned in traditional medicine references, this study was designed to evaluate the effect of chronic administration of SO on MDA level of brain tissue in diabetic male rats.

In this Experimental study, 32 male wistar rats, weighted 250-300 g, divided randomly into 4 groups: healthy control, healthy under treatment with SO, diabetic control, diabetic under treatment with SO. Diabetes mellitus was induced by inter-peritoneal single-dose streptozocin application (60mg/kg). Groups under treatment received food containing 6.25% of SO. Blood samples were obtained six weeks after the injection. Then the rats were anesthetized, brains were removed by opening the skull, then homogenized with normal saline and level of MDA according to TBARS method were measured by spectrophotometer. Data was analyzed with one-way ANOVA test.

Compared to healthy groups, serum glucose level in diabetic rats showed a significant increase ($P < 0.001$). Brain tissue level of MDA, significantly increased in diabetic ($P < 0.05$). SO treatment had desirable but non-significant reduction in tissue level of MDA compared to diabetic group ($P > 0.05$). Our study demonstrates that long term medication with SO in rats with DTM1 causes desirable and mild reduction in oxidative stress of brain tissue of diabetic rats and probably reduces effect of DTM1 on nervous system.



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**INHIBITION OF LIPID PEROXIDATION ACTIVITY OF DIFFERENT
EXTRACTS OF *SALVIA CERATOPHYLLA L.* FROM KASHAN**

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The genus *Salvia* (Lamiaceae) contains about 900 species, distributed historically throughout the world growing in temperate and subtropical areas, with about 70 species reported in flora Iranica. [1]. This study was designed to examine *in vitro* antioxidant activities various extracts of *Salvia ceratophylla*, prepared by different solvents. The samples were subjected to screening for their possible antioxidant activity via β -carotene-linoleic acid bleaching assay[2]. Activities of polar extracts were stronger than of non-polar with the order of methanol >hydro alcoholic>> n-hexane extracts. Standard BHT synthetic antioxidant was used as positive control in this study. Methanol extract with 885.0% inhibition was comparable with BHT standard (95.6%). Comparison of the results with standard antioxidant BHT confirmed that *S. ceratophylla* has noticeable antioxidant activity; however this activity is not much high, especially for non polar extract [3].

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**IDENTIFICATION OF MEDICINAL PLANTS IN GHARECHE REGION,
NORTHEASTREN OF KHORASAN, IRAN**

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Medicinal plants have been one of the first and most available resources are used for treating illnesses, since ancient times, and throughout history there has always been a close relationship between man and plants, and the medicinal effects of plants and their uses are undeniable nowadays. An ethnobotanical survey was conducted in Ghareche region, during two years, 2011 and 2012. Gharecheregion is located in northeastern of Khorasan, Iran, at the 58° 17' to 58° 23' latitude and 37° 20' to 38° 24' northern longitude with an average altitude of 1750 m, and a surface area of 120 Km². The collected plant species from the region were identified by using of available flora resources and then medicinal plants were separated by the scientific references. A total of 159 medicinal plants belonging to 135 genus and 50 families were identified in the region. This study revealed that the most common medicinal plant families were Asteraceae (25 species), Lamiaceae (13species), Brassicaceae (12 species), Fabaceae (10 species), Apiaceae (9species), Rosaceae (8species), Poaceae (6 species). The results of this study showed that the region has a great potential for producing medicinal plants.



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**THE EFFECT OF DOREMA AUCHERI- HYDROALCOHOLIC
EXTRACT ON LIPID FACTORS (LDL, HDL, VLDL, TG AND
CHOLESTROL) IN STZ–NICOTINAMIDE INDUCED TYPE 2 DIABETE
IN MALE RATS MODEL OF DIABETES**

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Cardiovascular disease is one of the important causes of mortality, particularly in patients with diabetes. In chronic diseases such as diabetes, metabolic disorders, and decreased the antioxidant power of blood, LDL concentrations increased and the can cause atherosclerosis disease. At present, the use of medicinal plants containing flavonoids due to its pharmacological properties and therapeutic for the treatment and prevention of cardiovascular complications of diabetes has been considered by researchers. In this study, 60 adult male rats (gr10 ± 180) to 6 groups flowing control (saline), diabetes, positive control (diabetic recipients Glibenclamide) and diabetic groups receiving doses of extracts 100 , 200 and 400 (mg / kg / day) groups then groups the investigated extracts of *Dorema aucheri* daily (5days at week) for 4 weeks (gavage). At the end of the study, blood samples and blood sugar levels, triglycerides, HDL, LDL and cholesterol in the serum was measured by special kits. The results showed that ethanol extracts of *Dorema aucheri* significant effect in reducing triglycerides and LDL, increased HDL and cholesterol no significant changes in the groups treated with the extract of diabetic rats compared to controls, diabetic rats treated with extracts a. Results of this study show that hydroalcoholic extract *Dorema aucheri* can control and reduce blood glucose and reducing triglycerides and LDL, increased HDL and cholesterol no significant changes may be effective in diabetic animals.

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**INVESTIGATION OF FLORISTIC, LIFE FORMS AND CHOROTYPE
OF MEDICINAL PLANTS OF SUMMER RANGELANDS OF NOOR
MAZANDARAN**

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Rangeland of Noor is located in 65 kilometers far from chamestan. It's geographical position $52^{\circ}, 01', 40''$ to $52^{\circ}, 12', 30''$ E and $35^{\circ}, 14', 25''$ to $35^{\circ}, 18', 05''$ N. Maximum and minimum elevation of study area varies from 3587 to 1750 m above level sea. In this study, list of plants, life forms and chorology were determined. 237 plant species are reported from the area. They are including 4 species from pteridophyta , 2 species from spermatophyta and 231 species from Angiosperms (including 47 monocotyledons and 184 Dicotyledons). 28 families and 144 genera are known from the area. The families with high number of species are including: poaceae (34 species), Lamiaceae (31 species), Asteraceae (31 species), Fabaceae (22 species), Rosaceae (19 species) and caryophyllaceae (12 species). Hemicryptophytes with 116 species (49 %), therophytes with 59 species (24.9 %) and Geophytes with 37 species (15.6%) are the most important life forms of the reserve. From the view point of regional elements plants of this region include: 202 species Irano-Touranian, 47 species Irano-Touranian and Euro- Siberian, 18 species Mediterranean, Euro-Siberian and Irano -Touranian, 17 species Euro-Siberian, 9 species Cosmic, 3 species Irano _ Touranian and Mediterranean and 1 species Irano-Touranian and Soharo - Sindian .



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COMPARATIVE STUDY OF ANTIOXIDANT ACTIVITY OF POLAR
AND NON-POLAR EXTRACTS FROM AERIAL PARTS OF
SALVIA CERATOPHYLLA L.

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Salvia L. is the biggest genus of labiate family. They are very important in food and medicine industry [1]. *S. ceratophylla L.* was collected during flowering period in May 2012 from shahsavaran valley (Kashan, Isfahan province, Iran). The methanol and n-hexane extracts from dried aerial parts of the plant were prepared via maceration at room temperature. Radical-scavenging activity and total phenolic content were measured by spectrophotometric methods [2]. Antioxidant activity of the methanol extract, measured via 2, 2-diphenyl-1-picryl hydrazyl (DPPH) assay was very higher than n-hexane extract (about 3 times). These results show that polar phytochemicals, such as flavonoids, phenols or other similar components may be important to play antioxidant role instead of compounds with low polarity such as unsaturated or conjugated terpenoids, carbonyl and other oxygenated hydrocarbons and such active antioxidants. Amount of phenolic compounds for the methanol extract was more than 5 times higher than n-hexane extract, based on gallic acid standard phenol; this finding confirms the results of DPPH assay [3, 4].

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**EFFECTS BORON AND NITROGEN ON GROWTH AND QUANTITY
YIELD OF PURSLANE IN AHVAZ REGION**

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Boron toxicity is mainly due to the use of salinewater in arid and semi-arid and also water containing relatively high levels of this element is common. The use of certain nutrients such as nitrogen reduces the harmful effects of high levels Boron. To evaluate the interaction of Boron and Nitrogen on growth and quantity yield of purslane (*Portulaca oleracea*), this study was conducted as a Randomized Complete Block Design (RCBD) with three replications at the Ramin Agriculture and Natural Resources University in September 2012. Treatments were four levels of Boron (zero, 1000, 1500 and 2000 ppm in soil kg of boric acid) and four Nitrogen levels (zero, 100, 150 and 200 mg in kg soil of urea). The results showed that nitrogen application increased leaf Fresh weight, Stem length and stem diameter, as where as boron application reduced biomass dry weight. The application of 200 mg/kg nitrogen with no application of Boron was made the most of significant difference. The minimum dry weight was observed in no application of nitrogen with 2000 ppm nitrogen in one kg soil (N0 B2000). With increasing of boron concentrations, Chlorophyll content was reduced. Finally, in soils with high levels of boron, nitrogen application can reduce the adverse effects of boron toxicity and also increases growth and quantity yield of purslane.

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BIOASSAY STUDY OF SAFFRON EXTRACT'S ALLELOPATHIC EFFECTS ON QUANTITATIVE AND QUALITATIVE TRAITS OF SOME OF MEDICINAL PLANTS

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In order to investigate the allelopathic effect of saffron on quantitative and qualitative traits of some of medicinal plants, an experiment was conducted under greenhouse condition in Ferdowsi University of Mashhad, Iran. Treatments were combination of two species (*Thymus vulgaris*, *Zataria multiflora*, *Ziziphora clinopodioides* and *Teucrium plium*) and corm and leaf extracts in four levels (0, 3000, 6000, 9000 ppm) arranged in a completely randomized design with four replications. Measured parameters were fresh and dry weight of root and shoot, shoot to root ratio, stomatal resistance, SPAD reading and essential oil percentage. Result indicated that interaction of corm and leaf extract concentrations affected fresh weight of root and SPAD reading. Four species showed different trends in different extract concentrations. In *Thymus vulgaris* and *Zataria multiflora*, with increasing extract concentration, stomatal resistance initially increased and then decreased but other species, other species didn't follow this trend. In total species, with increasing extract concentration, SPAD reading, initially increased and then decreased. In all species studied, except *Thymus vulgaris*, as extract concentration increased shoot to root ratio increased. Also, with extract concentrations, essential oil percentage decreased.

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THE EFFECT OF PLANTING PATTERN ON WEED DIVERSITY AND SOME PHYSIO-MORPHOLOGICAL CHARACTERISTICS OF BLACK CUMIN (*BUNIMUM PERSICUM L.*)

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The effect of planting pattern on weed density and diversity and some characteristics of black cumin (*Bunium persicum L.*), an experiment was conducted at Agricultural Research Station, Ferdowsi University of Mashhad, Iran, during 2011-2012. In this study, weed density, weed Shannon index, Caraway height, crown diameter and soil coverage percentage were measured on 3 years Caraway in random and row planting patterns. The results indicated that Height, crown diameter, soil coverage percentage, umbels per plant, umbelets per umbel and 1000-seed weight of black cumin, in row planting pattern were more than random planting pattern. Also, negative significant correlation was observed between total density of black cumin with total density and Shannon index of weeds.

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**INVESTIGATION OF MARIGOLD ALLELOPATHIC EFFECT ON
WEED COMPOSITION AND DIVERSITY OF TOMATO IN AN
INTERCROPPING SYSTEM**

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In order to investigate the role of Marigold (*Tagetes erecta*) allelopathic effects on weed composition and diversity of Tomato (*Solanum lycopersicum*), an experiment was conducted as split plot based on complete randomized block design with 3 replications at Agricultural Research Station, Ferdowsi University of Mashhad, Iran, during 2010 and 2011. Treatments included three Tomato varieties (Jina, Flat and strain hitack tork) and five cropping patterns (Tomato monoculture and Marigold- Tomato intercropping with 1:1, 1:2, 1:3 and 1:4 ratio). Results indicated that in the first sampling, the highest weed density was observed in Tomato monoculture (78.96 plants per m²). The lowest weed density was obtained in Marigold and Tomato intercropping with 1:3 ratio (37.62). In the second sampling, the lowest weed density was in Marigold and tomato intercropping with 1:3 ratio. In first sampling, total dry weight of weed was more than second sampling. In two sampling, the highest total dry weight of weed was observed in Marigold and Tomato intercropping with 1:3 ratio. By altering cropping pattern, Shannon, Margalof and simpson diversity indices of weed were changed. The lowest weed diversity indices were observed in Marigold and Tomato intercropping with 1:1 ratio. Also, significant positive regressions were obtained between insect diversity indices (Shannon, Margalof and simpson) and weed diversity indices.

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**DIRECT ADVENTITIOUS SHOOT INDUCTION AND PLANT
REGENERATION FORM SHOOT APEX EXPLANTS OF FENNEL
(*FOENICULUM VULGARE* MILLER)**

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Fennel (*Foeniculum vulgare* Miller) is a plant belonging to the Umbelliferae (Apiaceae) family, known and used by humans since antiquity. This species has been reported to show radical scavenging and antioxidant activity, analgesic, anti-inflammatory and anticancer properties. Plants propagated by tissue culture showed less variation in the content of secondary metabolites than their cultivated or wild counterparts. In this study rapid and efficient shoot propagation of fennel was achieved from sequential cutting of shoot apex explants cultured on Murashige and Skoog (MS) medium supplemented with different concentrations of thidiazuron (TDZ) or 6-benzylaminopurine (BAP). Optimal rate of adventitious shoot induction (16 shoots per explant) were observed at a lower concentration of TDZ (0.5 mg/l) in contrast with effectiveness of BAP at higher concentration (1.5 mg/l). Regenerated shoots elongated properly on a hormone-free MS medium and rooted on ½ MS medium supplemented with 1 mg/l of Indole-3-butyric acid (IBA). The protocol described in the present study can be used for *in vitro* mass production and genetic resources conservation as well as genetic transformation studies.

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**ADVENTITIOUS SHOOT FORMATION IN DECAPITATED
DICOTYLEDONOUS SEEDLINGS OF *SCROPHULARIA STRIATA***

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The *in vitro*-propagated medicinal plants furnish a ready source of uniform, sterile, and compatible plant material for biochemical characterization and identification of active constituents. *Scrophularia striata* which grows in Ilam province is used as a traditional medicine for treatment of diseases for years. Leaves of this plant contain both anti-cancer agents. In this study a new method for direct regeneration of *S. striata* using decapitation of shoot apical meristem at dicotyledonous stage was developed. The explants were cultured in Murashige and Skoog (MS) medium supplemented with different concentration of thidiazuron (TDZ). The results indicated that TDZ at lower concentration (0.25 mg/l) induced higher number of adventitious shoots (8 shoots per explant). The regenerated plants displayed normal phenotypes in *ex situ* conditions relative to the wild type.

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INCREASED PRODUCTION OF SESQUITERPENES IN HAIRY ROOT CULTURES OF *TEUCRIUM CHAMAEDRYS* BY ELICITATION WITH CHITOSAN

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Teucrium chamaedrys is a member of Lamiaceae family and useful in herbal medicine for its anti-inflammatory, anti-rheumatic, diuretic, antimicrobial anticancer effects. Sesquiterpenes germacrene D and β -caryophyllene are two main constituents of *T. chamaedrys* in most regions studied. These molecules have been demonstrated therapeutic potential in decreasing the progression of cancer. Many studies have described successful strategies for the increase in production of secondary metabolites by elicitation techniques. In the present study 21-day-old Hairy root lines of *Teucrium chamaedrys* were treated with different concentrations (0-200 mg/l) of chitosan (CHI). The results indicated that treatment with CHI (150 mg/l) was capable of increasing production of of germacrene D and β -caryophyllene up to 2.81- and 3.43-fold higher, respectively, compared to the level in untreated hairy root lines. Present results indicated the effectiveness of elicitation on secondary metabolites accumulation in hairy root culture of *T. chamaedrys*.

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**INDIRECT ADVENTITIOUS SHOOT INDUCTION AND PLANT
REGENERATION FORM LEAF EXPLANTS OF VALERIANA
OFFICINALIS L.**

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An efficient protocol for indirect shoot organogenesis and plant regeneration in *Valeriana officinalis* L. was established using leaf segments. Different concentrations (0.0–9.08 $\mu\text{mol l}^{-1}$) of thidiazuron (TDZ) in combination with different concentrations (0–6.78 $\mu\text{mol l}^{-1}$) of 2, 4-dichlorophenoxyacetic acid (2, 4-D) were used for callus induction and shoot organogenesis. The highest rate of callus growth and the highest percentage of explants forming shoots (79.37%) were obtained onto Murashige and Skoog (MS) medium supplemented with 9.08 $\mu\text{mol l}^{-1}$ TDZ and 6.78 $\mu\text{mol l}^{-1}$. Half-strength MS medium supplemented with 7.38 $\mu\text{mol l}^{-1}$ indole-3-butyric acid (IBA) was optimal for maximum number of adventitious roots (18.45 roots per shoot) induction. The *in vitro*-derived plantlets were successfully acclimatized in a growth chamber with 100% survival rate.

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AUTECOLOGY OF RHUBARB (*RHEUM RIBES*) IN YAZD PROVINCE

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Autecology, also called Species Ecology, the study of the interactions of an individual organism or a single species with the living and nonliving factors of its environment. Autecology is primarily experimental and deals with easily measured variables such as light, humidity, and available nutrients in an effort to understand the needs, life history, and behavior of the organism or species. Rheum (*Rheum ribes*) is a medicinal plant that wildy grows in some places of Iran. This research is the first ecological survey on Rheum. The purpose is was to study soil and ecological characteristics and measuring micronutrients in shoot, root and seed. Rheum ribes is a plant with strong roots and two kinds of stem: aerial stem and Rheum. Three sample soils were sampled at three depth of soil in rhubarb zone and this repeated in out of rhubarb zone. After analyzing the soil in the laboratory and statistical analysis of data by T-test, result showed the pH, soil texture and amount of limestone effected on growth of rhubarb. So rhubarb have been developed in range of 6.7 pH (lower than out of zone) with lighter soil texture (percentage clay and silt less and more sand) and more amount of limestone (38%) [1].

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**THE ESSENTIAL OIL COMPOSITION OF *ORIGANUM VULGARE* L.
SUBSP. GRACILE AT DIFFERENT DEVELOPMENTAL STAGES**

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To determine the best harvest time of *Origanum vulgare* L. subsp. Gracile to gain highest amounts essential oil. *Origanum vulgare* L. subsp. Gracile was harvested in two different stages (before flowering stage and after of flowering stage) and was dried. The essential oils were isolated by hydrodistillation and analyzed by GC/MS. The most essential oils of plants were in before flowering stage. In before flowering stage 48 compounds were identified in leaves oil of *Origanum vulgare* L. subsp. Gracile. The major components before flowering stage were Thymol (54.35%), γ -Terpinene (20.49%), P- Cymene (5.68%), β -Bisabolene (1.95%), β -Myrcene (1.6%), α -Thujene (1.24%), Ethyl linoleolate (1.15%). At after flowering stage 58 compounds were identified as the major components of plant essential oils: Thymol (32.35%), γ -Terpinene (29.9%), P- Cymene (10.37%), Carvacrol methyl ether (5.8%), Cis- α -Bisabolene (4.42%), α -Terpinene (3.03%), β -Myrcene (1.74%), Trans- Caryophyllene (1.48%), α -Thujene (1.12%), 4-Terpineol (1.06%). Conclusions: The major component of tested plant were Thymol, γ -Terpinene, P- Cymene which can introduce this species as efficient antibacterial and antioxidant agent. Furthermore, Results showed that, essential oil content of *Origanum vulgare* L. subsp is significantly affected by harvesting.



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**INVESTIGATE ON THE POSSIBILITY OF IMPROVING THE
QUALITY AND QUANTITY OF ESSENTIAL OIL PEPPERMINT WITH
A CHANGE IN THE EXTRACTION SYSTEM**

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Just as different environmental factors influence the amount and quality of essential oil, changes in extraction system status can also be effective on the amount and quality of essential oils extracted. The purpose of this experience was possible increasing the efficiency of essential oil extraction by changing the osmotic potential of extraction system using NaCl. The research was conducted on the medicinal plant Peppermint (*Mentha piperita*). The research was set as completely randomized block design with three replications. The results showed that the osmotic potential of the extraction system affect oil extraction efficiency significantly (at 0.01 level). The highest essential oils content of peppermint (2.167 %v/w) obtained using NaCl salt solution at 3% was increased 41% compared with controls. The efficiency of oil extraction in NaCl salt solution at 1% (1.733% v/) was the next in rank and more than 13% compared with controls. The Essential oils by GC and GC / MS were analyzed. The results showed that increasing the osmotic potential of the extraction system components and adversely affect any of the major components such as peppermint Menthol, Menthone, Pulegone, Neo-Menthol, 1,8-Cineole, Menthofuran, Iso- Menthyl acetate, Trans-Caryophyllen, Caryophyllene oxide, Limonene and Germacrene D than did control. According to the results of this study osmotic potential of the extraction system affect extraction efficiency of essential oils. Osmotic potential to further reduce salt use by 10 percent to reduce the extraction efficiency.



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GREEN SYNTHESIS OF SILVER NANOPARTICLES USING *CROCUS SATIVUS* PETALS EXTRACT

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Biosynthesis and characterizations of nanoparticles has become an important branch of nanotechnology. In this paper, green synthesis silver nanoparticles (AgNPs) using the flower petals extract of *Crocus sativus* as reducing and stabilizing agent, has been discussed. This approach is simple, cost-effective and stable for a long time, reproducible at room temperature and in an eco-friendly manner to obtain a self-assembly of AgNPs. The resulting nanoparticles are characterized using UV-vis, TEM, XRD and FT-IR spectroscopic techniques [1, 2].

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EFFECT OF DROUGHT STRESS ON SCROPHULARIA STRIATA

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In order to study the effect of different drought levels on germination of *Scrophularia striata* seeds, an experiment was completely randomized design with three replications in which factors were arranged as factorial. The experiment was carried out in a germinator (25±1 °C, 40% relative humidity). Our results show that drought stress has a significant effect on speed and percentage of seed germination. Furthermore the effect of different level of drought potential on their length of radicle and plumule and dry weight, is significant. As with growth of drought potential, the length and weight of radicle and plumule is decreased. Another important finding was that increase in drought stress, the percentage of decrease in plumule in the parallel of drought stress increasing, the percentage of plumule length is higher than radicle, it seems that the length of plumule have much sensitivity to drought potential tolerance. As a result, *scrophularia striata* germination can't be extremely tolerable to drought conditions so it seems that this plant can't be established in arid. The analysis of *scrophularia striata* response to drought level in germination state will help farmers to reach the desirable production and the best time for cultivation.

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**CALENDULA OFFICINALIS METHANOLIC EXTRACT USED AS
GREEN SYNTHESIS OF SILVER NANOPARTICLES**

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The aim of the present study was to evaluate the effect of plant synthesized silver nanoparticles (AgNPs) using methanolic leaf extract of *calendula officinalis*. The synthesized AgNPs were characterized by UV–vis spectrum, scanning electron microscopy (SEM), Fourier transform infrared and X-ray diffraction. The UV–vis spectrum of the aqueous medium containing silver nanostructures showed a peak at 421 nm corresponding to the surface plasmon resonance band of AgNPs. SEM supports the biosynthesis and characterization of AgNPs with spherical and oval in shape and size of 70–140 nm. [1, 2].

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**DEVELOPMENT OF AN INNOVATIVE HERBAL BEVERAGE FROM
SOYMILK -BILBERRY JUICE**

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Recently great afford have focused on the production of food and beverages which are rich in phenolic and antioxidant components .the epidemiology investigations have proved that the regular consumption of food and beverages are richer in phenolic and antioxidant components can strongly decrease the cardiovascular disease [1]. This was done after the preparation of components such as soymilk mixed with bilberry juice in this research ,the DPPH free radical method has been used in order to analyses the antioxidant activity [2], Folin-Ciocalteau and pH differential method were to estimate the amounts of phenolic compounds and antioxidant and anthocyanin [2].also the amount of vitamin c was estimated by standard method which is used for fruit juice .the data's were analyzed by SAS software .the maximum %scavenging capacity of radical DPPH was seen in sample (20 %soymilk and 80% juice) with the average of 41.88 %SC (ppm) ,85.5 mg/100ml of anthocyanin content,10.12 mgGAE /gr dry extract phenolic contents and 4.192 mg/100ml of vitamin c were reported which showed reduction in order samples .correlational researches shows appositve and significant relationship between the phenolic contents and anthocyanin and vitamin c of compound and their ability in neutralization of DPPH radical also Sensory Evaluation evaluated by trained panelists using the 5-point hedonic scale. This test showed improvement of all these factors in the samples related to "80% juice" treatment comparison with other samples.

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**PRIMARY STUDY OF SOME SECONDARY COMPOUNDS IN THE
EXTRACT OF *ATRIPLEX CANSENSES* AND EVALUATION OF ITS
ALLELOPATHIC IMPACTS ON *AGROPAYRUN ELONGATUM* SEED**

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The production of allelopathic compounds by plants has a direct and indirect effect on adjacent plant. The impact on various biochemical and physiological processes of plant are related to direct action. The indirect actions are including the alteration in soil nutrients, population of microorganisms. In this investigation to identify some responsible allelopathic compounds in the range plant of *Atriplex Canesense*, preliminary study was conducted. Then allelopathic potential of various concentrations viz. control, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 of studied plant were assayed on the seed germination, seedling growth, stem fresh weight, root fresh weight, vigor of seed radical length, hypocotyl length, chlorophyll and phenols of *Agropayrum elongatum*. Ten mentioned treatments in the form of completely randomized design with three replications were studied and when the F-test was significant ($P \geq 0.05$), means were separated on the basis of least significant difference (LSD). In the preliminary phytoconstitute screening of the whole aqueous water extract of studied plant, terpenoids and saponins detected and confirmed. Results of bioassay also indicated that *Atriplex Canesense* extract caused great inhibitory effect on seed germination, radicle length, seed vigor and chlorophyll content of test plant in confidence level 99% statistically. Inhibitory activity was dependent on degree of concentration. The content of phenols significantly increased with an increase in amount of concentration. It might be different organic, inorganic material and different quantity of terpenoids and saponins, phenols which were present in this study.

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EXAMINATION OF ANTIOXIDANT ACTIVITY OF IRANIAN
WALNUT'S GREEN HUSK

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Antioxidant capacity is related with compounds capable of protecting a biological system against the potentially harmful effect of processes or reactions involving reactive oxygen and nitrogen species (ROS and RNS). These protective effects of antioxidants have received increasing attention within biological, medical, nutritional, and agrochemical fields and resulted in the requirement of simple, convenient, and reliable antioxidant capacity determination methods. Walnuts are a good source of essential fatty acids and tocopherols. The health benefits of walnuts are usually attributed to their chemical composition. So the aim of this study is to identify anti oxidant activity of the essence from green husk of this valuable nut among all gathered samples from different parts of Iran. In the present work, the essences of were extracted separately using celevenger set. Then the antioxidant potential of walnuts'green husk samples was measured by scavenging activity on DPPH radicals method. Between all samples, the sample of Hamedan province represented the most anti oxidative activity. The IC 50 parameter also on DPPH curve was determined and this amount for the samples of the provinces of Tehran, Hamedan, Semnan, and Zanjan were 20±0.12, 27±0.015, 24±0.24, 22±0.17 mg/ml relatively. The results represent reliable activity of the essence of walnut's green husk in all gathered samples, among which the sample of Hamedan Province dedicated the most amount to itself. So it can be used as a natural source including anti oxidative components in drug and food industry.

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**EFFECT OF DROUGHT STRESS AND DIFFERENT PLANTING DATES
ON YIELD AND QUALITY OF SAFFLOWER**

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In order to study the impact of drought stress and planting date on yield and quality of safflower, an experiment was performed in Tabriz region in 2011. The experiment was carried out as split-split plot based on randomized complete block design. The main factor which was applied as split plot includes drought stress with three levels: (S₁) 80 ± 3 mm evaporation from basin level of class A, (S₂) 120 ± 3 mm evaporation from basin level of class A, (S₃) 160 ± 3 mm evaporation from basin level of class A. The subsidiary factor studied in this research was studying 2 levels of planting date including (D₁): conventional planting date in region (date: 2011/4/19) and (D₂): 20 days later from conventional planting date in region (Date: 2011/5/9). The sub-subsubsidiary factor was two different safflower cultivars include (V₁): Isfahan local cultivar and (V₂): Goldasht as modified cultivar. According to results the impact of drought stress on seed proline, oil percent, soluble sugar as well as seed yield was significant. The effect of planting date only for seed yield was significant. Effect of variety on protein content, oil percent and seed yield was significant. Results showed that in the experimented region, the planting date, 19 of April was more appropriate than the second planting date. According to high tolerance of safflower against drought, comparing with other crops, it may be a valuable and less excepted product for the environmental conditions [1, 2]. Isfahan local cultivar regard to native had higher yield potential in contrast to Goldasht.

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**GERMINATION CHARACTERISTICS OF THE MEDICINAL PLANT
PUMPKIN (*CUCURBITA PEPO*) CAUSED BY DROUGHT STRESS
CAUSED BY POLYETHYLENE GLYCOL 6000 AND SALINITY STRESS
CAUSED BY SODIUM CHLORIDE**

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In order to study the effect of drought stress caused by polyethylene glycol 6000 and salinity stress caused by sodium chloride on germination characteristics on pumpkin, experiment was done by randomized complete block design with four replications. Treatments is consisted of different levels of drought and salinity stress (0, -1, -3, -6, -9 and -12 bar) on germination percent, germination rate, radicle and plumule length, radicle and plumule dry weight, Total biomass, germination percentage reduction and mean percent germination. Our results indicated significant effects of drought and salinity stress on seed germination component. The highest percentage of germination is related to control treatment (zero or distilled water) and the least related to drought and salinity treatments (-12 bar). Germination has strongly reduced with decrease in water potential and increase in salinity. Furthermore, drought radicle weight has reduced from -12 bar to zero in salinity and drought treatments. After -9 bar potential, effect of drought stress has extremely reduced until zero in plumule dry weight, radicle and plumule length. Salinity and drought stress was significant at one percent level on total biomass yield, Reduction germination percentage and mean percent germination and considerable reduction was observed with increase in salinity and drought.

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INVESTIGATION OF PHYTOCHEMICAL SOME OF THE AROMATIC
PLANTS (15 SPECIES) FROM LAMIACEAE FAMILY IN PROVINCE OF
MAZANDARAN

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The family Lamiaceae has an important role as a source of medicinal and aromatic plants of commercial importance. In this study the species *Teucrium scordium*, *Hymenocrater elegans*, *Dracocephalum kotschyi*, *Betonica nivea* subsp. Mazandarana, *Clinopodium vulgare*, *Calamintha officinalis*, *Stachys pubescens*, *St. byzanthina*, *St. inflata*, *St. lavandulifolia*, *St. laxa*, *Mentha aquatica*, *Teucrium chamaedrys*, *Phlomis cancellata*, *Salvia multicaulis* were collected from the suburb of, Mazandaran Province, North of Iran and identified by Department of Botany, Research Center of Agriculture and Natural Resources of Mazandaran. The dried aerial parts (100 g) were subjected to hydrodistillation using a Clevenger-type apparatus for 3 h. The oil was dried over anhydrous sodium sulfate and kept at 4°C in a sealed brown vial until required. The oil was submitted to GC and GC-MS analysis.

The result showed that the major constituents of the oil were including: *Betonica nivea* subsp. Mazandarana (Cis-sesquibabinene hydrate 9.1 %), *Hymenocrater elegans* (Manoyl oxide 22.7%), *Ballota nigra* (Caryophyllen oxide 7.9). *Teucrium scordium* (Caryophyllene 22.8%), *Mentha aquatica* (1, 8-Cineole 27.2%), (Menthofuran 23.2%), *Stachys pubescens* (Camphor 5.5%), (Borneol 6.3%). *Phlomis cancellata* (Germacrene 25.6%), *Calamintha officinalis* (α -Pinene 7.4%), β -Pinene (16.3%), P-Cymene (7.5%), *Prunella vulgaris* (Selin-11-en-4-a-ol 14.9%). *Salvia multicaulis* (α -Pinene 7.5%), *Ballota nigra* (Caryophyllene oxide 7.9%), *Stachys byzantine* (epi-13-Manoyl oxide 4.5%), *Stachys inflata* (Hexadecanoic acid 9.1%), *Stachys lavandulifolia* (4-Hydroxy-4-Methyl-2-pentanone 9. %3), *Stachys laxa* (4-Hydroxy-4-Methyl-2-pentanone 12.3%), (Germacrene D 17.1%).

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**NANOEMULSIFICATION *SALVIA OFFICINALIS* ESSENTIAL OIL
FOR TOPICAL DELIVERY**

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Many herbal medicines have been prescribed in traditional medication of upper respiratory tract infections (UTIs) by inhalation, including *Salvia officinalis* (SO) or sage [1]. Essential oils as a major active component of medicinal plants suffer from low solubility in the aqueous phase, which results in a reduced access to the respiratory tract pathogens. In this work, nanoemulsions of SO were prepared using different formulation conditions and additives. The effect of stabilizers and their ratio were found to be of critical importance. The prepared nanoemulsions were characterized in terms of particle size, size distribution and essential oil content immediately after preparation and over 6 months stability test. The results showed that a nanoemulsion with mean particle size $205/3 \pm 3/4$ nm and size distribution $37/5 \pm 15/6$ nm could be designed, which loaded 99% of the added essential oil. The antibacterial studies were then carried out using MIC and MBC to compare the prepared nanoemulsion with pure essential oil against Gram-negative (*Haemophilus influenza*, *Pseudomonas aeruginosa*, *Moraxella catarrhalis*) and Gram-positive bacteria (*Streptococcus pneumonia*) URTI pathogenic bacterias [2]. The MBCs for pure essential oil were 2 mg/ml for *Streptococcus pneumonia*. However, this figure was reduced to 0/0312 mg/ml for the above mentioned bacteria using nanoemulsification technique of SO essential oil. These results may highlight the importance of nanoemulsification for improvement of antibacterial activity and more conventional delivery of essential oils.

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PHYLOGENETIC RELATIONSHIPS BETWEEN MEMBERS OF THE
GENUS *TEUCRIUM* L. IN IRAN

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The genus *Teucrium* L. with more than 100 species is a large genus belonging to the lamiaceae family. Members of the *Teucrium* are usually dwarf scented shrubs distributed in north Africa, Europe, Asia, but mainly in Mediterranean region. In Iran *Teucrium* has 12 species (19 taxa) that 3 species are endemic to Iran. Some members like *T. chamaedrys* and *T. polium* have been used from ancient as medicinal plants. For example in Iranian folk medicine *T. polium* is used as anticonvulsant and antispasm. Also an ethanolic extract showed anti inflammatory, antipyretic and antibacterial activities, and *T. chamaedrysis* used as a diuretic, antiseptic, antipyretic and antihelminthic agent.

The phylogenetic relationship between *Teucrium* members in Iran is not clear to us. But according to the morphological and molecular data the genus *Ajuga* is the nearest relative group to the *Teucrium*. To find out how is the relationship between the genus members, first we collect more species of *Teucrium*, then determined them exactly. Now after DNA extraction, PCR and DNA sequencing process, we are going to clear the phylogenetic relationship up by using sequence data from the complete internal transcribed spacer region (ITS) of nuclear ribosomal DNA. It has been demonstrated that the ITS is very useful for discriminating relationships among close species.

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HARVEST TIME EFFECT ON THE HERB YIELD AND ESSENTIAL OIL CONTENT OF SWEET BASIL (*OCIMUM BASILICUM* L.)

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In order to evaluate the best harvesting time on the herb yield and essential oil content of basil, an experiment in a randomized complete block design with three replications was carried out in Saveh city (Iran, markazi province). Aerial parts of plants were harvested from 10 centimeters of land at 3 stages including: before flowering, full flowering and fruit set in the beginning and then were dried in air and shade. Harvest time had a significant effect on fresh weight (5% level), dry weight and essential oil of aerial parts in 0/1% probability level. So the best treatment was the fresh weight fruit set in the beginning and full flowering stages, the dry weight fruit set in the beginning. The highest essential oil content (1/02%) was extracted at before flowering stage and the essential oils obtained from plants harvested at full flowering and fruit set in the beginning stage, .86 and .87%, respectively.

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ANTIOXIDANT AND FREE RADICAL SCAVENGING ACTIVITY OF
METHANOLIC EXTRACT OF WILD
STACHYS LAVANDULIFOLIA (VAHL.) POPULATION IN IRAN

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Stachys lavandulifolia Vahl. (Lamiaceae) is widely distributed in many regions of Iran, Iraq and Anatolia. Extracts obtained from the aerial parts of *Stachys lavandulifolia* are used in Iranian folk medicine, as remedies for the treatment of various painful and inflammatory diseases. In this paper, the antioxidant activity of Seven *Stachys lavandulifolia* Population was determined. Plant material of *Stachys lavandulifolia* were collected across five provinces from the Northwest to the Northeast of Iran including the provinces of West Azerbaijan, East Azerbaijan, Kordestan, Zanjan and Khorasan. Methanolic extract was used in this experiment. The antioxidant activity by DPPH test was investigated for all the extract. The results of antioxidant activity for studied population showed that the highest and lowest IC₅₀ for DPPH radical-scavenging activity was 51.7 for chahar Taq and 23.1 µg ml⁻¹ for Darrod, respectively.

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**INVESTIGATION OF MARIGOLD ALLELOPATHIC EFFECT ON
INSECT DIVERSITY AND DISEASES OF TOMATO IN AN
INTERCROPPING SYSTEM**

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In order to investigate of Marigold (*Tagetes erecta*) allelopathic effects on insect diversity and diseases of tomato (*Solanum lycopersicum*), an experiment was conducted as split plot based on complete randomized block design with 3 replications at Agricultural Research Station, Ferdowsi University of Mashhad, Iran, during 2010 and 2011. Treatments included three Tomato varieties (Jina, Flat and strain hitack tork) and five cropping patterns (Tomato monoculture and Marigold- Tomato intercropping with 1:1, 1:2, 1:3 and 1:4 ratio. Results indicated that the highest percentage of predator populations was observed in Tomato and Marigold intercropping with 1:2 ratio. The lowest percentage of predator populations was obtained in Tomato and Marigold intercropping with 1:1 ratio. The highest Margalof and simpson diversity indices of insect was obtained in Marigold and Tomato intercropping. In total harvestings, the highest relative frequency of healthy fruits was in Tomato and Marigold intercropping with 1:2 ratio. Among Tomato varieties, Hitak-strain Tork and Jina had the highest relative frequency of healthy fruits. The highest relative frequency of healthy fruits and the lowest relative frequency of unhealthy fruits were observed in Jina variety (0.28 and 0.63 respectively). The Positive significant regression relationship was obtained between Shannon and Margalof index with relative yield of healthy fruits per unit area.

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INTRODUCTION OF MEDICINAL PLANTS OF ASADABAD AREA

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Asadabad area covers an area of 1719 hectares situated in East of Ashtian city Province. The view of area is Cold mountainous. Altitude domain of area is between 1750 to 2300m. The average annual rainfall is about 230mm. The average maximum temperature is 23°C in August and minimum temperature is -15°C in January. This investigation was done for collection and determination of medicinal plants of Asadabad area. By regard to source, aware and informed persons and visible observations were determined 59 medicinal species and were noted some of information as: Persian or local, scientific and family name, Vegetative form. This medicinal plants belonged to 38 genus and 20 families, that the most species were in Labiatae (8 species), Compositae (7 species) and Papilionaceae (5 species) families. The flora of area belonged to Irano – Turanian region.



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USING OF CUMIN ESSENTIAL OILS TO CONTROL OF FOOD
POISONING IN DRY WHEY

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Microbial activity is a primary mode of deterioration of many foods and is often responsible for the loss of quality and safety. Concern over pathogenic and spoilage microorganisms in foods is increasing due to the increase in outbreaks of food borne disease. There is strong interest in the use of naturally occurring compounds which have antibacterial activity for preservation of minimally processed foods. Plant essential oils are a potential source of antimicrobials of natural origin. Dry whey is a fermented product of milk which contains suitable amount of protein and minerals but due to unhygienic processing during its production, some pathogenic bacteria are seen in it. In the past times, cumin seed as a grassy plant were used for food flavoring and treatment of some disorders (flatulence, high cholesterol in blood). Recently; studies have shown that this plant has antimicrobial effect on Gr⁺ and Gr⁻ bacteria. Therefore, we collected 30 samples of dry whey and cultured them to determine *E. coli* and *Staph aureus* presence. 3% of samples contaminated with *E. coli* and 18% of them contaminated with *Staph aureus*. Essential oils of cumin seed extracted by Clevenger and then added to contaminated samples at different dilutions. After 2 days, microbial tests repeated. Results showed that cumin essential oils have good antimicrobial effects on *E. coli* at 1.5% dilution and on *Staph aureus* at 2% dilution. Total count of contaminated dry whey samples which were not countable, decreased to 100 CFU in 2% dilution of essential oil. Also in this work, sensory characterizations for utilization considered [1, 2]. Results of this study showed using of essential oil in dry whey producing can control some bacteria. At the end it is advised using of essential oils of plants in food technology.

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**STUDY OF INHIBITORY EFFECT OF *ZATARIA MULTIFLORA* BOISS.
ESSENTIAL OIL, NISIN AND THEIR COMBINATION ON THE
PRODUCTION OF *STAPHYLOCOCCUS AUREUS* (ATCC 6538)
ENTEROTOXIN C**

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Studies in substitution of chemical flavoring agent with natural ones (*Zataria multiflora* Boiss. essential oil and nisin) have improved in order to reach to a suitable compound for prevention of the growth of pathogen bacteria especially *Staphylococcus aureus* in foods. Heat stable Enterotoxins of *S. aureus* cause gastroenteritis syndrome. In this study, the effect of different concentrations of *Zataria multiflora* Boiss. Essential oil (EO; 0%, 0.005%, and 0.015%), nisin (0, 0.125, and 0.25 $\mu\text{L}/\text{mL}$), and their combinations on the production of staphylococcal enterotoxin C (SEC) by *Staphylococcus aureus* at different inoculation levels (10^3 , 10^4 , and 10^5 cfu/mL) in brain heart infusion broth during storage at 35°C for up to 43 days was evaluated. The SEC production was significantly ($p < 0.05$) inhibited by EO concentration at levels 0.015% and 0.005%, respectively. Significant ($p < 0.05$) inhibitory effect of EO on SEC production at level 0.005% was observed when it was used in combination with nisin= 0.125 $\mu\text{L}/\text{mL}$. The significant ($p < 0.05$) synergistic effect of EO= 0.005% and nisin= 0.125 $\mu\text{L}/\text{mL}$ was observed as more reduction than EO= 0.005% alone. Further, EO significantly ($p < 0.05$) prevented SEC production by *S. aureus* in this study. Therefore *Zataria multiflora* boiss in subinhibitory concentrations can use with other preservation factors as new approach for biocontrol of *S. aureus*.

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**ANTIMICROBIAL PROPERTIES OF *SALVIA OFFICINALIS*
ESSENTIAL OIL IN VAPOUR PHASE; THE EFFECT OF
NANOEMULSIFICATION**

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In aromatherapy, essential oils have been used to treat respiratory tract infections (URTIs). Inhalation of essential oils such as *Salvia officinalis* (SO) oil has been used to treat pharyngitis, bronchitis and sinusitis [1]. Essential oil in vapour phase could be highly effective against bacteria at relatively lower concentrations than the liquid phase [2]. In this work, nanoemulsions (NE) of 20% w/w SO were prepared using different surfactants with a range of HLB values. The chemical composition of SO in liquid as well as in the vapor phase was determined by gas chromatography (GC), gas chromatography/mass spectrometry (GC-MS) and single drop micro extraction coupled with gas chromatography mass spectrometry (SDME GC-MS) respectively. The antimicrobial activity of SO essential oil and its NE were evaluated against four URTI pathogenic bacteria in vapor phase using well diffusion method. The minimum inhibitory concentration (MIC) in vapor phase was determined for SO oil and NE. The MICs for pure essential oil in vapor phase was 689.65 µl/l, while this value was reduced to 270.34 µl/l for NE. Variations of the major active compound (1,8-cineol) in SO oil in vapor phase were studied over time with SDME technique for pure essential oil and NE. The higher activity observed for NE can be explained by the slow release of active compound from the NE as a reservoir.

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SEED OIL CHEMICAL COMPOSITION DETERMINATION OF DOG
ROSE (*ROSA CANINA* L.)

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Dog rose (*Rosa canina* L.) is a valuable deciduous shrub which has long been used for food and medicinal purposes in various parts of the world. The fruit is noted for its high vitamin C content and its seed are a good source of valuable fatty oil. This study aimed to quantitatively determine the chemical composition of seed oil of *Rosa canina* L. ecotype from Lorestan province in west of Iran. Fruits of wild grown dog roses were harvested in full maturity stage in September 2008. They were kept in cold box during transportation. Then the pericarp and seeds of the fruit were separated and dried at room temperature. The dried seeds without bristle hairs were grinded to a coarse powder and swelled in 70% ethanol solution for 24 hours. The oil of the seeds was extracted using of a homemade Cold-press device which was designed and tested in our research group. The chemical composition of the extracted oil was studied by gas chromatography-mass spectrometry (GC/MS) after evaporation of the solvent using rotary evaporator. The identification of components was done using comparison of their MS spectrum to standard spectrums in the library of GC/MS and Kovats indices to the standard values cited in the scientific literature, respectively. 29 different components were identified in the seed oil. The following 10 identified compounds Hydroxy methyl furfurole (27.9%), Formic acid ethenyl ester (8.7%), Mono acetin (5.2%), 3,5-Octadien-2-one (4.8%), Furfural (4.1%), 4-H-pyran-4-one,2,3-dihydro-3-,5-dihydroxy-6-methyl (4.1%), Cyclo hexanone (3.9%), 3-Hydroxy tetra hydro furan (3.2%), Hexadecanoic acid (3.3%) and Glycerol (3.0%) are the major components and had the highest amount in seed oil, respectively. These ten components contain 69% of all components in Dog rose seed oil. And the others 19 different components only 31% all of the components in Dog rose seed oil. The results of this research showed different components of the seed oil of Dog rose studied in this research indicated the importance for food and medicinal purposes. This method was found to be rapid and simple for clean and cheap extraction and identification of seeds oil components.



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**EXTRACTION AND DETERMINATION OF BUGLASS
(*ANCHUSA ITALICA* RETZ.) SEED OIL CHEMICAL COMPOSITION**

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Buglass (*Anchusa italica* Retz.) belonging to family Boraginaceae. There is no reported about the composition of seed oil of this species. This study aimed to quantitatively determine the chemical composition of seed oil of *Anchusa italica* Retz. ecotype from Lorestan province in west of Iran. Seeds of wild grown Buglass were harvested in full maturity stage in June 2008. They were kept in box during transportation to laboratory and then dried at room temperature. Finally, the dried seeds were grinded to a coarse powder and swelled in 70% ethanol solution for 24 hours. The oil of the seeds was extracted using of a homemade Cold-press device which was designed and tested in our research group. The chemical composition of the extracted oil was studied by gas chromatography-mass spectrometry (GC/MS) after evaporation of the solvent using rotary evaporator. The identification of components was done using comparison of their MS spectrum to standard spectrums in the library of GC/MS and Kovats indices to the standard values cited in the scientific literature, respectively. Finally 19 different components were identified in the seed oil. The following 10 identified compounds: Hexadecane (21.00), Heptadecane (13.67), N, N-dimethyl-ethanolamine (13.42), Benzaldehyde 4-methyl (7.83), Beta-d-glycoside, 3, 6-glucuronomethyl (7.79), Tetradecane (6.50), Hexadecanoic acid (4.35), Heptanoic acid (2.92), Gamma butyrolactone (2.89) and 9-Octadecenoic acid (2.65) are the major components and had the highest amount in seed oil, respectively. These ten components contain 83.02% of all components in Buglass seed oil. And the others 9 different components only 16.98% all of the components in Buglass seed oil. The results of this research showed different components of the seed oil of species studied in this research that grows extensively in many place of Iran indicated the importance of these seeds for food and medicinal purposes and This method was found to be rapid and simple for clean and cheap extraction and identification of seeds oil components.



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**EFFECT OF DIFFERENT LEVELS OF SALINITY STRESS ON
GERMINATION INDICES AND SEEDLING GROWTH OF
FENUGREEK (*TRIGONELLA FOENUM L.*)**

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To study the effect of different levels of salinity stress on germination indices and seedling growth of *Trigonella foenum L.*, an experiment was conducted in agronomy laboratory of Faculty of Agricultural Sciences at University of Guilan in 2012. The experiment was arranged base on randomized completely design with four replications. The used treatments were including different levels of salinity stress due to NaCl (0, -2, -4, -6, -8, -1, -1.2, -1.4, -1.6 and -1.8 MPa). Results showed, increasing of salinity levels decreased germination percentage, germination speed, germination energy, germination rate index, seedling length, dried and fresh weight of seedling and vigour index significantly ($p < 0.01$). However, the levels of salinity (-0.2 and -0.4 MPa) increased dried and fresh weight of seedling in relation to control by growth stimulation. Also, there wasn't significant difference between control and different levels of salinity in Alometric coefficient and water percentage of seedling tissue. Moreover, germination rate reduction had increased trend in relation to control. Generally, the results showed fenugreek seed can tolerate salinity amount until -1.2 Mpa in germination time.



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THE EFFECTS OF SALINE AND DROUGHT STRESS ON
GERMINATION CHARACTERISTICS OF GLOBE ARTICHOKE
(*CYNARASCOLYMUS*)

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In order to evaluate the study of the germination and primary growth of globe artichoke (*Cynarascolymus*) Under saline and drought stress, two separate laboratory experiments were conducted on Agricultural Faculty of Shahid Chamran University of Ahvaz in 2012. The experimental design was completely randomized, with three replications. The first experiment were different drought stress levels with Poly ethylene glycol(PEG) 6000 including(0, -2, -4, -6 and -8 bar) and the second experiment was different salinity levels including(0, 50, 100, 150 and 200 mM) with NaCl. Germination percent and speed, radicle and plumule length and weight were measured. The results showed that drought and saline stress had significant impact on germination characteristics. The highest germination percent and speed were obtained at control treatment (no stress) and the lowest were related to -8 bar drought stress and 200 mM saline stress. Also, the radicle and plumule length and weight were decreased with increasing in saline and drought stress levels. Finally the result showed that the globe artichoke (*Cynarascolymus*) could be fairly tolerant to saline and drought stress in germination stage. The tolerant threshold of artichoke to saline and drought stress were 100 mM and -4 bar respectively.

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**STUDY OF YIELD AND YIELD COMPONENTS IN DIFFERENT
ECOTYPES OF SAFFRON (*CROCUS SATIVUS* L.)**

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In order to study yield and yield components of different saffron ecotypes (Mashhad, Torbat-Jam, Gonabad and Birjand), an experiment was conducted during 2009-2010 cropping seasons in Mashhad region. The experimental design was a randomized complete block design (RCBD) with three replications. The results of variance analysis showed that there are high significant differences between different ecotypes of saffron on all traits. The results of mean comparisons showed that Mashhad ecotype and Birjand ecotype in all of traits, especially in the yield of saffron, were the best and the worst ecotypes in Mashhad climatic conditions, respectively. Also, the cluster analysis and comparison of different ecotypes was found for all traits are indicated ecotypes of Mashhad and Torbat-Jam were most similar and were in a class and ecotypes of Birjand and Gonabad were in another class. Finally, according to the result from this study, we can express that environment and climate conditions have high effects on yield and yield components in saffron. And they can cause significant changes in saffron ecotypes. Therefore it is recommended to establish the new saffron fields, we consider to corms quality of saffron, saffron ecotypes and environmental conditions. And regions where saffron will be cultivated for the first time, it's very important that proper tests are done for choosing the best ecotypes.



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**EVALUATION OF DIFFERENT SOWING DATES ON YIELD AND
YIELD COMPONENTS IN SAFFRON (*CROCUS SATIVUS* L.)**

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In order to evaluation of yield and yield components in different sowing dates of saffron (May 4, June 4, July 4, August 4, September 4 and October 4), an experiment was conducted during 2009-2010 cropping seasons in Mashhad region. The experimental design was a randomized complete block design (RCBD) with three replications. The results of variance analysis showed that there are high significant differences between different sowing dates of saffron on all traits. The results of mean comparisons showed that sowing date in July 4 had the most positive effects on saffron yield and this sowing date was in good condition in the other traits. Also it was revealed that delaying culture, especially in September and October months, will sharply reduce yield and yield components of saffron. The correlation coefficients results also showed that between saffron yield and all yield components exists positive and significant correlations, so any improvement in these components will ultimately improve saffron yield. Also the result of path analysis showed dry weight of saffron corm had high significant positive effect on saffron yield and could justify more than 92% of variation of saffron yield. The next step in path analysis, it revealed that traits: fresh weight of saffron corm, leaf number, leaf length and leaf weight had the most direct and indirect effects on the improvement of dry weight of saffron corms so these traits could justify more than 99% of variation of dry weight of saffron corms. Generally, the results from this experiment indicated that the best time for establishing new saffron farms was July 4 in Mashhad. On the other hand, it was cleared that corms with high weight have direct and positive effect on saffron yield. Also it can be concluded that improving the leave traits such as number, length and wide of saffron can improve dry weight of saffron corms directly and improving saffron yield in next year indirectly.



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**ANTIDEPRESSANT LIKE EFFECT OF ETHANOLIC EXTRACT OF
AVENA SATIVA L. IN THE FORCED SWIM TEST AND TAIL
SUSPENSION TEST IN MALE MICE**

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The present study was designed to evaluate the antidepressant effects of *Avena sativa* L. ethanolic extract in the forced swim test (FST) and tail suspension test (TST) in male mice. Male NMRI mice (20-30g) were used in this study. Negative and positive control groups received normal saline (10ml/kg, i.p.) and fluoxetine (20mg/kg, i.p.) respectively. Treatment groups received different doses of *Avena sativa* L. ethanolic extract (50, 100 and 200 mg/kg, i.p.). In FST, each animal was individually introduced into a swim chamber, and was scored for 6 min on the duration of immobility. A decrease in the duration of immobility is indicative of an antidepressant-like effect [1]. Duration of immobility induced by TST was measured during 6-min and mice both acoustically and visually isolated were suspended 50 cm above the floor by adhesive tape placed approximately 1 cm from the tip of the tail [2]. Our results showed that *Avena sativa* L. ethanolic extract (100 and 200 mg/kg, i.p.) (152.4±16.6 and 125.4±9.59; P<0.05 and P<0.001 respectively) compared to control group (205.6±3.89) significantly and dose- dependently reduced the duration of immobility time in FST and only high dose (200mg/kg) of extract better than fluoxetine (129±8.45) reduced this time. In TST, all doses of extract (50, 100 and 200 mg/kg) (80±11.05, 76±7.89 and 56.8±6.28, P<0.001 respectively) compared to control group (216.4±7.69) significantly and dose- dependently reduced the immobility time and all doses of *Avena sativa* L. better than fluoxetine (128 ±8.44) reduced this time. In conclusion, the antidepressant-like effect of the *Avena sativa* L. ethanolic extract seems to be mediated by inhibition of monoamine oxidase inhibitor-B (MAO-B) and phosphodiesterase- 4 (PDE-4) and thereby by increasing dopamine and noradrenalin levels in synaptic cleft induced antidepressant like activity [3,4]. However, to better understand this interaction, future studies are needed.

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**IDENTIFICATION THE VOLATILE OIL COMPOUNDS IN
(*HYPRICUM PERFORATUM* L.) BY SPME-GC/MS METHOD**

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St John's wort (*Hypricum perforatum* L) is a valuable and widely known as an herbal medicinal plant which has long been used for medicinal purposes and treating mild forms of depression in various parts of the world. Herb and flowers contain various essential oils composed mainly of sesquiterpenes. This study aimed to identify and determine the volatile oil composition of herb of *Hypricum perforatum* L. ecotype from Hamedan province in west of Iran. An ultrasonic assisted headspace solid-phase microextraction (UA-HS-SPME) method coupled to gas chromatography-mass spectrometry (GC/MS) was used for the analysis of compounds in the St John's wort species harvested in full bloom stage from Sarab Gian, Nahavand City in June 2008. The identification of components was done using comparison of their MS spectrum to standard spectra in the library of GC/MS and Kovats indices to the standard values cited in the scientific literature, respectively. As a result, 24 different components were identified in the herb of St John's wort using this method. The following 13 identified compounds including β -Caryophyllene (25.05%), α -pinene (15.24%), γ -Cadinene (8.05%), α -Selinene (7.38%), Germacrene-D (6.71), limonene (6.51), Myrcene (6.13%), δ -elemene (3.48%), δ -Amorphen (3.24%), Unknown (3.06), valencene (2.64%), β -pinene (2.36%) and β -elemene (2.34%) are the major components and had the highest amount in herbal volatile oil, respectively. These 13 components contain 96.17% of all components and the other 11 different components only 3.83% of all the components in St John's wort volatile oil. The results of this research showed that UA-HS-SPME method is simpler and needs much less sample amount, in addition to high ability of trapping and extraction of more volatile and thermo-sensitive compounds, but because of limited capacity of fiber coating, a simultaneously exhaustive analysis such as HD, is needed to acquire the absolute weight percentage of constituents using HD method.



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**INTRODUCTION AND IDENTIFICATION OF MEDICINAL PLANTS
OF ZARGHAN REGION IN FARS PROVINCE**

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Plants are basic organisms in food chain. They have been the center of attention to man since the beginning of history. Dependence of man to the plants had persuaded him to identify useful and harmful plants. Nowadays, there is an interest for research on medicinal plants in the world and also in our country because of that many people prefer them to the chemical drugs. Today, medicinal plants have found a special position in the pharmaceutical research in the world. The medical community pharmacists and specialists have increased the use of medicinal plants and its products because of disadvantages and side effects of chemical drugs. Climate variation in Iran has been caused variation in vegetation. Collection and identification of medicinal plants will help progress in non-chemical. The region of Zarghan with an area of more than 381000 Km² is situated between 52.43 E. and 29.47 N. is located in the central of Fars province. The average rainfall is 512.77mm a year. In this research, the vegetation of Zarghan was investigated. Sampling was done from 20 locations. The plants were collected by survey and field work method, and all the necessary information were recorded in a notebook. Afterwards, all of the selected plants were pressed over the standard cardboard. By the help of key characteristics, the families of plants were recognized and by the help of other characteristics their genus and species were identified. In this study Latin and Persian references were used. 51 species of medicinal plants were identified and classified in 22 families. The most prevalent species were belonging to Asteraceae, Brassicaceae, Fabaceae, and Lamiaceae families. Some genus such as *Salvia* sp., *Plantago* sp. were the most frequently medicinal plants in the region. Dicotyledonous plants were the dominant species.



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**EFFECT OF SEED PRETREATMENT WITH NANO-PARTICLE OF
TITANIUM DIOXIDE, ASCORBIC ACID AND SALICYLIC ACID ON
STORABILITY OF *NIGELLA SATIVA* L. SEEDS**

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The use of nano technology is a new method for storage and protection of plant materials. For this purpose a factorial experiment in a completely randomized design with three replications was conducted in the Agricultural Research Laboratory, University of Birjand. Effect of seed pre-treatment with salicylic acid, ascorbic acid, each at three levels (0/5, 1 and 1/5 mM) and nano-particles of titanium dioxide levels (50,100 and 200 ppm), were evaluated under accelerated aging test. Analysis of variance showed that the germination rate, seedling length and germination percent were significantly affected under prime concentrations of all three solutions. The rate and percentage of germination was also influenced by prime material type ($P < 0.01$). Fresh weight of seedlings at the concentrations used showed significant differences ($P < 0.05$). The results showed that the use of titanium dioxide nano-particles with a concentration of 100 ppm, created maximum speed of germination and seedling length.

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**ANTIMICROBIAL EFFECT OF EXTRACT OF *ALLIUM SATIVUM* AND
LAVANDULA OFFICINALIS ON *BACILLUS CEREUS* AND
*PSEUDOMONAS AERUGINOSA***

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Therapeutic properties of essential oil and extracts against bacterial and non bacterial diseases are known since ancient times and many studies on different plant species and their essential oil or extracts effect on microorganisms are done. In this study, the effect of hydro alcoholic extract of *Allium Sativum* and *Lavandula officinalis* on *Bacillus cereus* and *Pseudomonas aeruginosa* was tested in laboratory conditions. The hydro alcoholic extracts (70%) were prepared by Maceration method and were examined in different concentrations on *Bacillus cereus* and *Pseudomonas aeruginosa* on Mueller Hinton agar medium. The hydro alcoholic extracts of *Allium Sativum* had no effect on *Pseudomonas aeruginosa* and *Haemophilus influenza* but *Lavandula officinalis* had significant effect on both bacteria ($p < 0.001$); So that the zone diameter of no growing for *Pseudomonas aeruginosa* (0 mm) was lower than *Bacillus cereus* (12.4 mm) at lower concentration of leaf extract (500 mg/1ml Solvent). The average of zone diameter of no growing for *Pseudomonas aeruginosa* (10.4 mm) and *Bacillus cereus* (21.4 mm) by extract of *Lavandula officinalis* (3000 mg/1ml Solvent) was obtained lower than *Erythromycin*, *Ofloxacin* (20.4 and 28.4 mm, respectively), and *Gentamicin* (26.4 and 32.4 mm, respectively). Results showed that *Lavandula officinalis* has fairly antimicrobial effects on *Pseudomonas aeruginosa* and *Bacillus cereus* and can be substitute for some common antibiotics and has less chemical effects [1, 2].

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IN VITRO CALLUS INDUCTION AND PRODUCTION OF ANTITUMOR TRITERPENOIDS IN CALLUS CULTURE OF SALVIA SAHENDICA

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Betulinic acid (BA), oleanolic acid (OA), and ursolic acid (UA) are highly valuable pentacyclic triterpenoids because of their wide spectrum of biological activities such as anti-inflammatory, hepatoprotective, antitumor, anti-HIV, antimicrobial, antifungal, anti-ulcer, gastroprotective, hypoglycemic, and antihyperlipidemic [1,2]. In the present study, *in vitro* callus induction and production of BA, OA and UA in callus culture of *Salvia sahendica* (Lamiaceae), an endemic species which is growing in the northwest of Iran [3], have been studied for the first time. Callus induction was achieved from young leaf and intermodal explants cultured on MS [4] medium supplemented with different concentrations of auxins 2, 4-D and NAA (0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 mg/L) solely or in combination with cytokinins BAP and Kin (0.1, 0.5 and 1.0 mg/L). High percentage of callus induction (100%) was obtained in explants cultured on MS medium supplemented with 1.0 mg/L 2,4-D+0.5 mg/L BAP. The production callus biomass became stable with a growth index of 6 or more after the eight subculture cycles. MS medium supplemented with 1.0 mg/L 2,4-D plus 0.5 mg/L BAP was also the most favorable medium for callus formation with the greatest fresh weight of callus (0.55 g per explants). Triterpene acids in the aerial part of wild plant and cultured calli were quantified by HPLC. After 28 days, calli those were induced from *S. Sahendica in vitro* seedlings and maintained on the same medium of callus formation in the absence of light produced 17.3, 126.3 and 121.6 mg/100g DW of BA, OA and UA, respectively. Our results show the merit of *in vitro* callus culture of *S. sahendica* for production of medicinally important triterpenoids. It can be also provide an ample opportunity to take this plant for extensive research for mass cultivation on plants and enhanced antitumor compounds production through different biotechnological strategies like cell suspension cultures and large scale cultivation in bioreactor system.

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ANTIBACTERIAL ACTIVITY OF EXTRACTS OF SALVIA
CERATOPHYLLA L. FROM KASHAN

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Treatment of the infectious diseases with antimicrobial agents continues to present many problems in modern day medicines. A couple of studies show significant increase in the incidence of side effects and the resistance that pathogenic microorganisms build against several antibiotics [1]. Therefore, scientist attention has been paid to plant extracts and biologically active compounds isolated from plant species as herbal medicines to treat infections recently. Several *Salvia* species are indigenous in Iran and are widely used as beverages and spices and for their medicinal properties [2]. *Salvia ceratophylla* was collected from Shahsavaran valley (Isfahan province, Iran) in May 2012. The extracts were studied for antibacterial activity against 3 strains of gram-positive (*Staphylococcus aureus*, *Staphylococcus epidermidis* and *Bacillus subtilis*) and 6 strains of gram-negative bacteria (*Escherichia coli*, *Salmonella typhi*, *Shigella dysantriae*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Proteus vulgaris*) via two methods, including disc diffusion [3] and minimal inhibition concentration (MIC) [4,5]. Methanol and hydroalcoholic extracts didn't show any antibacterial activity against microorganisms, but *n*-hexane extract was active against three bacteria, *S. dysantriae*, *K. pneumoniae*, *P. aeruginosa*. with MIC > 1000 µg/ml, respectively

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**PRODUCTION OF ROSMARINIC ACID IN CALLUS CULTURE OF
SATUREJA KHUZISTANICA AND *SATUREJA RECHINGERI***

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Rosmarinic acid (RA) is a well known valuable phenolic compound because of its wide spectrum of biological activities such as antimicrobial, anti-inflammatory, antimutagenic, improvement of cognitive performance, prevention of the development of Alzheimer's disease, cardioprotective effects, reduction of the severity of kidney diseases, antioxidant and cancer chemoprevention [1, 2]. In the present study, an efficient protocol has been developed for callus induction and production of RA in callus cultures of *Satureja khuzistanica* and *S. rechingeri* for the first time. *In vitro* callus induction was achieved from young shoot tip explants cultured on MS [3] and B5 [4] media supplemented with different concentrations of IBA (0.1, 1.0, 2.0 and 5.0 mg/L) solely or in combination with cytokinins BAP and Kin (1.0, 2.0 and 5.0 mg/L). B5 medium supplemented with 1.0 mg/L IBA plus 5.0 mg/L BAP and MS medium fortified with 2.0 mg/L IBA and 2.0 mg/L BAP were the most favorable media for callus formation with the highest induction rate (96.2%) and greatest fresh weight of callus (2.34g and 1.72 per explants, respectively). Maximum growth index (2.89) was obtained from the callus cultured on B5 medium supplemented with 1.0 mg/L IBA plus 5.0 mg/L BAP. The growth kinetics of both species callus cultures followed a general growth pattern of sigmoid curves. Determination and quantification of RA in cultured calli were performed by HPLC UV/ELSD and HPLC UV/MS. Calli those were induced from *S. rechingeri* and *S. khuzistanica* and maintained on supplements of IBA and BAP in the absence of light produced RA 2.48% and 1.09% based on dry weight (DW), respectively. No differentiation was observed in any callus during the course of this study.

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**COMPARISON OF ALLELOPATHIC ACTION OF THREE GROUPS OF
MEDICINAL PLANTS (ESSENTIAL OIL PLANTS, ALKALOID
PLANTS AND FLAVONOID PLANTS) ON THREE WEED
SPECIES**

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Utilization of Allelopathic effect of medicinal plants is one of the recent approaches in medicinal plants issue. In order to investigate the Allelopathy of three major groups of medicinal plants containing Essential oil plants (*Eucalyptus globulus* and *Salvia officinalis*), Alkaloid plants (*Datura stramonium* and *Nerium oleander*) and Flavonoid plants (*Artemisia absinthium* and *Hypericum perforatum*) on three wide-ranges Iranian weed species (*Amaranthus retroflexus*, *Chenopodium album*, *Portulaca oleraceae*), a factorial experiment was conducted on CRD base template in Ecophysiology lab of Shahid Beheshti University, Medicinal Plants research institute. Pre-emergence factors studied in petridishes and post-emergence factors studied by planting weeds in pots filled by perlite. After treating weeds by active herb extracts, 21 traits of weeds growth were studied. Different groups of medicinal plants have significant difference in affecting some weed's traits such as: chlorophyll florescence, chlorophyll saturation, root wet weight, shoot wet weight and shoot dry weight (Post-emergence), and germination, germination speed, germination initiation speed (pre-emergence). The overall results showed although different groups of medicinal plants have different effect on suppressing weeds growth, but Essential oil plants have higher effect in more studied traits.



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ALLELOPATHIC EFFECTS MEDICAL PLANT OF *SALICORNIA HERBACEA* L. EXTRACTS ON GERMINATION AND SEEDLING GROWTH OF *HYSSOPUS OFFICINALIS* AND *TARAXICUM OFFICINALIS*

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In this study, the ethanolic extracts obtained from dried *Salicornia herbacea* L. seeds and leafs were evaluated in vitro to examine its potential allelopathic effects. The inhibitory effect of the extract at 0, 2.5, 5 and 10% (i.e., g amounts of original extract in 100 ml of distilled water) on germination and seedling of *Hyssopus officinalis* and *Taraxicum officinalis* were tested. The effects of *Salicornia herbacea* leafs and seeds extract on *Hyssopus officinalis* as medicinal plants were obviously different from the weed of *Taraxicum officinalis*. *Hyssopus officinalis* with increase in concentration of seeds extracts, only increased growth root length and with increase in concentration of leafs extracts, growth of shoot length increased at 2.5 to 5% concentrations. Seed germination in *Hyssopus officinalis* at all concentrations of seed and leaf no significant change. In this study result showed that seed and leaf concentrations have been almost positive effect on *Hyssopus officinalis*. In addition, seed and leaf concentration have been almost negative effect on *Taraxicum officinalis*. the negative effects on weed may be related to the presence of allelochemicals and active compounds , including tungtungmadic acid, Chlorogenic acid, β -sitosterol, stigmasterol, uracil, quercetin 3-O- β -D-glucopyranoside, and isorhamnetin 3-O- β -D-glucopyranoside, betaine, phenolic compounds(procatechuic acid, ferulic acid, caffeic acid, quercetin, isorhamnetin) and saponins in *Salicornia herbacea* L. Optimum concentrations of *Salicornia herbacea* L seed and leaf extracts could be used as herbicides in the control of weeds.



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**THE EVALUATION OF CHANGES IN POLYPHENOLIC ACID AT
VEGETATIVE, FLOWERING AND POST FLOWERING STAGES IN
HIBISCUS SABDARIFFA LINN.**

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Hibiscus sabdariffa is a plant from Malvaceae family, *Hibiscus* genus and *sabdariffa* species, *sabdariffa* species has red sepals that are edible and has such medical various like antioxidant reservation against liver toxicity, anti fungal and antibacterial effect and blood pressure reduction. Phenolic or polyphenolic compounds divided to 15 main categories with more than 8000 known compounds. The biggest group is flavenoids that contains 12 types and more than 5000 compounds [1].

In this research the study of polyphenolic changes have been done by HPLC. The comparison of polyphenolic in different growth stages showed that the vanilic acid from 17.385 ppm at before flowering stage, increased to 49.127 and 52 ppm in flowering stage and post flowering stage respectively. The amount of Narengenin at before flowering stage was 151.28 ppm and then decreased to 26.61 ppm in flowering stage and 14.4 ppm in post flowering stage. The amount of Caffeic acid was 3.352 ppm in before flowering stage and changed to 2.64 ppm in flowering time and 72.87 ppm in post flowering stage. The amount of Cholorogenic acid was 126.82 ppm in before flowering stage and changed to 164.11 ppm and 150.12 ppm in order in flowering and post flowering stages. The results also have been shown that Cholorogenic acid had the highest amount among phenolic compound in 3 stages. There was no Gallic acid in before flowering stage but Catcchin was only before flowering stage in amount of 150.12 ppm. It seems the amount of Catcchin in before flowering stage and the high amount of Naringenin in mentioned stage is a reason to increase antioxidant activity in before flowering stage.

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**THE INFLUENCE OF EMBRYO STAGE ON HAPLOID INDUCTION IN
MEDICINAL PUMPKIN**

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Medicinal Pumpkin (*Cucurbita pepo convar. pepo var. styriaca*) is an annual plant that has been introduced to Iran in recent years. Its effective components are used to cure some diseases such as prostat hyperplasia, taenia controlling, Arleriosclerosis, regulation of alimentary canal and hormonal balance especially in women and strengthening men sexual appeal in advanced countries. In this research, several embryo types and stages were investigated for their effects on plant regeneration and haploid production of a genotype of medicinal pumpkin. Embryos were extracted from plants pollinated with gamma irradiated pollens. Five gamma ray doses (25, 50, 75, 100 and 200 Gy) were used for embryo induction. After 3-5 weeks from pollination, embryos were taken out and classified according to type and stage of development and cultured at $28 \pm 1^{\circ}\text{C}$ with 16-h photoperiod (3,000 lux) thereafter. Embryo regeneration, plant production and haploid plant induction were recorded and the largest amounts of extracted embryos were cotyledon type that it accounts for 35% of the total embryos (132 embryos). The results showed that regeneration rate changed with embryo type and stage. Necrotic embryos were not regenerated, and the greatest regeneration rate was observed in arrow-tip embryos (54.55%). All amorphous embryos had only diploid plants while cotyledon, heart, torpedo, arrow-tip, torpedo-tip, globular and stick embryos produced 8.1, 23, 48.4, 75, 87.5, 94.4 and 100% haploid plant, respectively.

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**EFFECT OF PHYTOHORMONES WITH DIFFERENT
CONCENTRATIONS ON CHEMICAL COMPONENTS OF
ESSENTIAL OIL OF *SAMBUCUS CANDENSIS* L.**

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Plant hormones are a group of chemically diverse molecules that control virtually all aspects of plant development. In this study the effects of growth hormones (IAA, NAA and GA₃) with different concentrations on essential oil of *Sambucus candensis* L. were evaluated. The composition of the essential oil was analyzed by GC and GC-MS. 31 compound were identified in plant oil. Some detected compounds can be responsible for the plants biological and/ or toxic activities. Results indicate that IAA, NAA and GA₃ have significant effect on the concentration of essential oil. Many components were increased such as cis pinocarvyl ac in effect of treatment hormone GA₃ (25 ppb), compared to the control is about 7 times and some of them decrease significantly such as Dehydro aromadendrene in effect of treatment hormone NAA (50 ppb) to control the intensity has decreased. In some cases, the compounds were eradicated of induced completely such as β-thujone. It seems a useful method for changing the concentration of the essential oil compounds.

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COMPARISON OF HORMONAL CHANGES (IAA, GA₃) OF THE
COMPOSITION OF ESSENTIAL OIL FROM *SAMBUCUS RACEMOSA* L.
LEAF

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Plant hormones are a group of chemically diverse molecules that control virtually all aspects of plant development. In this study the effects of growth hormones (IAA and GA₃) with different concentrations on essential oil of *Sambucus racemosa* L. leaf were evaluated. The composition of the essential oil was analyzed by GC and GC-MS. 34 compounds were identified in plant oil. Some detected compounds can be responsible for the plant's biological and/or toxic activities. Results indicate that IAA and GA₃ have significant effects on the concentration of essential oil. Many components were increased such as Longifolene in effect of treatment hormone GA₃ (50 ppb), compared to the control is about 9 times and some of them decrease significantly such as asgeraniol in effect of treatment hormone IAA (150 ppb) to control the intensity has decreased. In some cases, the compounds were eradicated or induced completely such as isoeugenol. It seems a useful method for changing the concentration of the essential oil compounds.

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**EFFECTS OF PLANTING TIME AND SPRAYING ON YIELD AND OIL
PRODUCTION OF PEPPERMINT (*MENTHA PEPERITA* L.) IN
MAZANDARAN**

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Peppermint has a long tradition of medicinal use. Peppermint oil is commonly used as flavoring in foods and beverages and as a fragrance in soaps and cosmetics. In order to study the effects of planting time and spraying on yield and oil production of peppermint (*Mentha peperita* L.) in Mazandaran, an experiment was conducted in a split plot based on randomized complete blocks design with four replications at the Agricultural Experiment Station of Sari Agricultural Sciences and Natural Resources University during 2009-2010. Treatments consisted of two levels of planting time (5 April and 5 September) and two levels of spraying of microelements (with and without spraying). The results showed that planting time and spraying had significant effect on dry matter, plant height, shoots number and although the essential oil percentage of peppermint. Spraying of microelements lead to more dry matter production and the essential oil percentage compare to non-spraying. In conclusion, planting in and foliar spraying of microelements is recommended for maximum yield and oil production of peppermint.



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**QUALITY IMPROVEMENT AND SHELF LIFE EXTENSION OF
FRESH SEEDLESS BARBERRY: A MEDICINAL FRUIT**

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Fruits are not only colorful and flavorful component of human diet, but they also serve as a source of energy, fiber, minerals, vitamins and antioxidants [1]. Small fruits such as strawberry and barberry are rich in antioxidants [2]. Barberry fruits are dried in the sun traditionally to extend shelf life and maintain the fruit quality. However, modern society requires fresh products with better quality and free of microbial infection. The aim of this initial study was to evaluate the efficacy of blanching and controlled atmosphere storage with high CO₂ on quality, storage life and microbial control of fresh fruits. Fruits were detached from branches and then dipped in a water bath (65 °C) for 40 s prior to dip in distilled water (20 °C) for 40 s. Thereafter, they were placed into container and controlled atmosphere (CA) storage was created with injection of CO₂ gas into sealed container (2% CO₂/18% O₂), (10% CO₂/10% O₂). Air (0.04% CO₂/21% O₂) was used as control. After treatment they were stored at 3 or 20 °C. Shelf life and quality parameters were assessed. Symptoms of fungi infection observed in all treated fruit that were stored at 20 °C during the second week, while fruits that were stored at 3 °C had better appearance and color, without any signs of fungi growth even in the fourth week. Controlled atmosphere storage at high CO₂ concentration (10 %) had greater effect on microbial control of fruits in both storage temperatures. Overall, modified atmosphere to a higher concentration of CO₂ (10%), blanching and storage at 3 °C significantly increased postharvest life, improved the fruit quality without off-flavor, maintained vitamin C content and retarded fungi growth significantly in the fresh fruits compared with the control for more than 3 months.

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**INFLUENCE OF VACUUM PACKAGING AND DIFFERENT STORAGE
CONDITIONS ON QUALITY AND ASCORBIC ACID OF FRESH
SEEDLESS BARBERRY FRUIT**

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Ascorbic acid (AA) is a water-soluble antioxidant known to be important to health [1]. Recently, the amount of recommended vitamin C intake has been increased to more than 300 mg/d [2]. The content of vitamin C in fruits and vegetables can be influenced by various preharvest factors, maturity at harvest and postharvest treatments [3]. Temperature management after harvest is the most important factor to maintain vitamin C of fruits and vegetables; losses are accelerated at higher temperatures and with longer storage durations [3]. The loss of vitamin C after harvest can be also reduced by storing fruits and vegetables in modified atmospheres. Blanching reduces the vitamin C content during processing, but limits further decreases during the frozen-storage of horticultural products [3]. Barberrry fruits are rich in antioxidants that dried in the sun traditionally to extend shelf life and maintain the fruit quality. However, modern society requires fresh products with better quality. The aim of this study therefore was to evaluate the efficacy of different packaging and storage conditions on antioxidant content of fresh barberry fruit. Fruits were detached from branches and then blanched by dipping in a water bath (70 °C) for 40 s prior to dip in distilled water (20 °C) for 40 s. After 30 minutes, fruit were placed into plastic containers and packed with or without medium vacuum packaging. Thereafter, they were stored at 3 or -20 °C for 3 months. Quality parameters and ascorbic acid were assessed monthly. As final parts of this experiment have not finished yet, our results (obviously in a new version of this abstract) will be presented before the deadline for registration, late in February 2013.

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**GERMINATION RESPONSE OF POMEGRANATE SEEDS TO
POTASSIUM NITRATE, SULFURIC ACID AND HOT WATER
PRETREATMENTS**

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Punica granatum L. (Punicaceae) is one of the most important horticultural plants cultivated in arid and semiarid parts of Iran. The physiological effects of pomegranate juice constituents are remarkable in their preventive potential against two of the major chronic diseases of aging - heart disease and cancer [1], mainly due to considerable amounts of vitamins, polyphenols, antioxidants and important minerals. However, these properties differ depending on genetic of cultivar, climate, maturity at harvest and cultural practice [2]. On the other hand, regarding to some poor characteristics such as chilling susceptibility, fruit cracking and sunburn, hard seededness and so on, there are some breeding objectives to improve present pomegranate cultivars from quantitative and qualitative aspects. Selection of appropriate parents for some characters and hybridization, seed collection and germination should be done to obtain new progenies or varieties. Seed germination is an important phase of breeding program and high germination percentage is needed. Cold stratification is well-known to increase pomegranate seed germination [3]. However, there are some obstacles in this way [3], [4]. So, the main aims of this paper were to evaluate the effects of hot water, potassium nitrate and sulfuric acid treatments accompanied with continuously moist chilling on seed germination of pomegranate. Dipping treatments were: sulfuric acid (25%) for 5, 10, 15 or 20 min; potassium nitrate (2 or 4%) for 24 or 48h; hot water (50 or 80 °C) for 2 or 4 min. and hot water (50 or 80 °C) for 2 or 4 min. followed with cold water (5 °C) for 2 or 4 min. All treated seeds were then stored in refrigerator under dark condition at 5 °C for 30 and 60 days. Thereafter, they transferred to an incubator (dark and 25 °C). Germination percentage, speed of germination, mean daily germination, the day of 50% emergence and radicle length were measured. The highest seed germination and mean daily germination were resulted from potassium nitrate (4%) for 48 h. Generally, increment of soaking time in sulfuric acid increased germination percentage and hot water (80 °C) strongly prevented seed germination. It is supposed that pomegranate seeds may have mechanical and physiological dormancy. Thus, potassium nitrate may be used as a pretreatment to improve pomegranate seed germination.

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**THE CHANGES OF HYPOPHYSYS HORMONES IN PCOS RATS THAT
TREATED WITH AQUEOUS FENNEL EXTRACT**

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PCO affects approximately 5-10% of women in the reproductive age. LH and FSH are the pituitary hormone that control ovarian function [1, 2]. The aim of this study was to determine the incidence of abnormal LH/FSH ratio in female rats that induced PCO with Estradiol-Valerate and the fennel affection of equilibrium of abnormal hormones in PCO rats. In this research, after preparing the aqueous fennel extract, forty female rats divided into five equal groups were categorized in: 1) Control group: rats received just food and water: 2) Rats were gavaged by high dose fennel extract: 3) Rats were injected by Estradiol-Valerate for induction of PCOS, 4) Rats were injected by Estradiol-Valerate and treated with high dose fennel extract, 5) Rats were injected by Estradiol-Valerate and treated by low dose fennel extract. After one month, serum level of LH and FSH were determined by analyzer system and then assayed by SPSS .Normally FSH is higher than LH but in PCO group this ratio was reserved, with LH being higher than FSH. In PCO group that treated with fennel LH and FSH rate became almost normally. PCOS is a metabolic disease that disturbs LH and FSH rates but fennel returns the hormones to normal conditions. We can suggest that fennel can treat the PCO and the high dose is more effective.

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**EFFECTS OF BIOFERTILIZERS AND CHEMICAL ON
QUANTITATIVE AND QUALITATIVE YIELD OF DRAGONHEAD
(*DRACOCEPHALUM MOLDAVICA* L.)**

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In order to have a sustainable agriculture it is necessary to use environmental friendly inputs to improve ecological aspects of environment. An experiment was conducted at Research Station, Faculty of Agriculture, Shahed University of Tehran, Iran, in year 2011-2012. A complete randomized block design with five treatments, and three replications was used. The treatments were: control (no fertilizer), biological nitrogen, biological phosphorus, biological nitrogen + biological phosphorus and chemical origin of nitrogen + phosphorus + potassium. In this experiment, 1000 seeds weight, plant height, seed yield, biological yield, harvest index (HI), essential oil and essential oil yield were studied. Mean comparison was carried out using Duncan multiple range test ($P < 0.05$). According to the results, maximum of essential oil (0.53%) in the treatment of biological nitrogen + biological phosphorus and the minimum of essential oil (0.33%) in control (no fertilizer treatment) obtained. The maximum of essential oil yield ($1.51 \text{ g}^1 \text{ m}^2$) in the treatment of biological nitrogen + biological phosphorus and the minimum of essential oil yield ($0.41 \text{ g}^1 \text{ m}^2$) in control (no fertilizer treatment) obtained. The maximum of harvest index (58.58%) in the treatment of biological nitrogen + biological phosphorus and the minimum of harvest index (49.43%) in control (no fertilizer treatment) obtained. In all studied traits, application of some biofertilizers was significantly better than control treatment (no fertilizer).



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**FEASIBILITY STUDY OF CONEFLOWER (*ECHINACEA PURPUREA*
L.) CULTIVATION IN INTERCROPPING WITH GREEN BEANS
(*PHASEOLUS VULGARIS* L.) AT DIFFERENT PLANTING DATES IN
SARI REGION**

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Coneflower (*Echinacea purpurea* L.) is one of the five top selling medicinal plants through out the world [1]. In modern cultures, *E. purpurea* is used to treating acute upper respiratory infections, urinary tract infections, burns and viral infection disorders etc [2]. Since this valuable plant is just introduces to the flora of Iran [3], this study was done to explore the feasibility of it cultivation under intercropping with green beans at different planting dates in Sari, Mazandaran province, Iran region, in order to develop cultivation of the plant in the large-scale to meet the requirements of pharmaceutical industries. Accordingly, a completely randomized design (CRD) in split plot experiment with three replications was conducted in Research Farm of Sari University of Agricultural Sciences and Natural Resources, during 2011-2012. Treatments included planting date and different row intercropping ratios of coneflower and green beans. Results showed that the coneflower grows well in Sari, but due to its low vigor index, it is better to transplant by July 1st. According to the experiment, medium-textured soils with enough drainage, row planting and drip irrigation are necessary for suitable growth. Results also indicated that coneflower-green beans mixed-cropping had the best performance than pure stand in Sari. Overall, these findings increase the hope of improvement and extension of coneflower cultivation and production in Sari as well as in similar climate.

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**CITRUS AURANTIUMIN L. ESSENTIAL OIL PRODUCES
ANTIDEPRESSANT LIKE EFFECTS IN THE FORCED SWIM TEST
AND TAIL SUSPENSION TEST IN MICE**

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This study investigated the effect of *Citrus aurantium* L. essential oil in the mouse forced swim test (FST) and in the tail suspension test (TST), two models predictive of antidepressant activity. In this experimental study, 40 male NMRI were divided into 5 groups: Control (Tween 80-12% v/v in saline, 10ml/kg), positive control (fluvoxamine, 20mg/kg) and essential oil treatment groups (5, 10 and 20 mg/kg, i.p). In FST, mice were individually forced to swim in an open cylindrical container. In TST, mice both acoustically and visually isolated were suspended 50 cm above the floor by adhesive tape placed approximately 1 cm from the tip of the tail. In both of tests the total duration of immobility were recorded during 6-min period and decrease in the duration of immobility is indicative of an antidepressant-like effect [1, 2]. Our results indicated that all doses of essential oil in both FST (73.13±10.25, 66.19±9.21 and 38.38±10.54; P<0.001, respectively) and TST (62.93±4.28, 58.12±5.37 and 48.93±5.36, P<0.001) compared to control groups (175.66±14.8 and 121.21±15.52, respectively) significantly and dose- dependently reduced the duration of immobility time [3, 4]. But, fluvoxamine in both FST (31.03±6.58, P<0.001) and TST (38.07±5.26, P<0.001) models showed potent efficacy than all doses of essential oil for reducing immobility time. Based on our findings and in accordance with other reports it seems that antidepressant like effect of *Citrus aurantium* L. essential oil was attributed to the presence of the limonene (a specific component of the oil), with recognized antidepressant activity on the central nervous system [3]. However, to better understand this mechanism, future researches are needed.

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**STUDY ON EFFECT OF SOME ENVIRONMENTAL FACTORS ON
MORPHOLOGICAL TRAITS AND ESSENTIAL OIL PRODUCTIVITY
OF *THYMUS CARAMANICUS* JALAS**

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Genus *Thymus* (Lamiaceae) consists of about 250 species. Fourteen species grow naturally the Iran of which four are endemics [1]. *Thymus caramanicus* Jalas is one of the endemic species of genus *Thymus* L. which dispreads in central Iran. In this study, natural habitats of this species were identified during travels to different regions in Kerman, Esfahan and Semnan provinces in the early of growth season in 2010. Ten complete plants were collected from seven localities in order to study and evaluate morphological characters. Flowering stems were used to investigate essential oil quantitatively. Data of locations, vegetative and reproductive characters of every population and amount of essential oils of each location were recorded. The results were analyzed using cluster analysis method with SPSS software and correlation between evaluated traits and essential oil productivity were determined. Populations were clustered based on all characters in 2 groups separately. Populations were collected from Kerman and Esfahan provinces placed in a same group and populations from Semnan provinces were placed in an independent group. Differences between these two groups may be from different climates in their habitats and adaptation of them to their different environmental factors. Finally, specimens from Kerman province showed best vegetative and reproductive characters and also highest essential oil production, therefore it is recommended for breeding programs or cultivation.

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ANTI-BACTERIAL PROPERTIES OF ETHANOL EXTRACTS OF ALGAE
(*ENTREROMORPHA INTESTINALIS*, *CYTOSEIRA MYRICA*, *GRACILARIA
CORTICATA*) AGAINST THE BACTERIA, *BACILLUS CEREUS* (PTCC1015) AND
STAPHYLOCOCCUS AUREUS (PTCC1112)

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The aim of this study was to investigate the antimicrobial properties of ethanol extract of three algal species of Persian Gulf. *Bacillus cereus* a gram-positive rod and aerobic bacteria. This bacteria was recognized as one of the food intoxication factors and the first time was isolated after an out break of food poisoning in 1969 at America (1). *Bacillus cereus* is the cause of 25 percent of the food poisoning in the world and create two types of toxicity associated with two types of toxins (2). *Staphylococcus aureus* is a non-motile, spherical, gram-positive bacteria, which is seen double and short chains or clusters under microscope. Do not produce spores and is an anaerobic bacteria (1). The algae were washed with water to completely free of sand and organisms, then placed in distilled water that was replaced every few hours. This process was repeated three times, then rinse and dry in the dark. The samples were crushed and Extraction procedure was performed at room temperature by 70% alcohol (3). Isolated bacteria were prepared from Pastor Institute. 0.5 McFarland standard was used. Extracts were prepared with concentrations of 50,100,150 mg. ml⁻¹ in distilled water. Antibacterial sensitivity test was performed three times for each concentration with disk diffusion and well. The diameter of inhibition zones were measured and expressed in millimeters. The results from each stage were averaged (4). Tetracycline antibiotics were used as positive controls. With measuring the inhibition zone, sensitivity or resistance of bacteria were determined in different concentrations of the extracts. Average diameter of growth zones in *Entreromorpha intestinalis* and *cystoseira myrica* extracts against *B. cereus* were 8.33 ± 1.52 and 11 ± 1 mm, respectively and compared to the positive control (24.33 ± 2.51 mm) have significant differences ($P < 0.05$). Average diameter of growth zones in *E. intestinalis* and *c. myrica* extracts against *S. aureus* bacteria were 13 ± 2.6 and 19 ± 3.6 mm respectively, compared with the positive control (18 mm) have not significant differences ($\text{sig} > 0.05$). *Gracillaria corticata* had no effect on any of this bacteria. This study represented that the best antibacterial activity against both bacteria occurred in the *c. myrica* extract. Materials with polar and hydrophilic properties passed more easily from the cell wall of gram-positive bacteria because of their cell wall structure.



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ESSENTIAL OIL VARIABILITY AMONG SOME POPULATIONS OF
THYMUS CARAMANICUS JALAS FROM IRAN

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Thymus caramanicus Jalas. (Lamiaceae) is an endemic herb growing wild in Iran [1]. Essential oils of seven different populations of *T. caramanicus*, collected at full flowering stage, were obtained by hydrodistillation. The essential oils content was varied from 0.41 to 2.9% (w/w). About 97.9-99.9% of the total constituents were detected by GC and GC-MS analyses, of which oxygenated monoterpenes (87.5–97.5%) were the main group of the constituents in all populations. The main components of the essential oils were carvacrol (19.8-96.2%), thymol (0.6-61.8%), and p-cymene (0.2-8.2%). Therefore, the phenolic compounds, including carvacrol and thymol, were the most abundant constituents in the oils of all populations, which seem to play a significant role in the adaptation of this species to its environment that is characterized by dry hot climate and calcareous, stony soils.

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**ESSENTIAL OIL COMPOSITION OF *LEUTEA KURDISTANICA*
MOZAFF. AT THE VEGETATIVE AND FLOWERING STAGES**

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Leutea kurdistanica Mozaff. (Apiaceae) is an endemic herb growing wild in Iran [1]. Essential Oil Variability of wild population of *Leutea kurdistanica* at different phenological stages including vegetative and flowering were studied for the first time by GC-FID and GC-MS. In total 26 components were identified in vegetative and flowering stages, representing 98.5 and 99.3% of the oil, respectively. The ranges of major constituents were as follow: α -asarone (50.5–62.5%), elemicin (16.4–22.5%), α -phellandrene (1.3–5.9%) and α -pinene (1.6–5.4%). trans-asarone was the major compound in both of stages which it can be used for wide range of applications in pharmaceutical and food industries.

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**THE EFFECT OF DIFFERENT CHEMICAL FERTILIZER RATES ON
*NEPETA RACEMOSA***

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In this study, the effect of different chemical fertilizers application rates was evaluated on *Nepeta racemosa*, as a high value medicinal plant. The experiment was conducted in 2012 in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experiment design was randomized complete block with three replications. Treatments were different ratios of nitrogen and phosphorus fertilizers (N_0P_0 , N_0P_{150} , $N_{300}P_0$ and $N_{300}P_{150}$ kg/ha). Analysis of variance indicated the significant effect of chemical fertilizer on morphological features such as plant height, length of the longest internode, main stem diameter, the number of flowering stems, the number of non-flowering stems, total number of stems, inflorescence length, leaf width and leaf length at $P \leq 0.01$, and the number of inflorescence at $P \leq 0.05$. All traits were the highest in $N_{300}P_{150}$ and the lowest in N_0P_0 . Mean comparison indicated that plant height (63.06 cm), length of the longest internode (7.7 cm), main stem diameter (0.49 cm), the number of flowering stems (71.33), the number of non-flowering stems (72.9), total number of stems (144.25), inflorescence length (12.17 cm), the number of inflorescence (12.64), leaf length (2.47 cm) and leaf width (1.65 cm) were the highest in $N_{300}P_{150}$. All traits were the lowest in the control; indicating that plant growth and yield is affected by a suitable ratio of N and P application rates.



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**THE EFFECT OF ROW INTERCROPPING OF SESAME
(*SESAMUM INDICUM* L.) WITH FLAX (*LINUM USITATISSIMUM* L.)
ON NUMBER, DENSITY AND POPULATION OF WEEDS**

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Sesame (*Sesamum indicum* L.) is widely naturalized in tropical regions around the world and is cultivated primarily for its edible and oil-rich seeds, and flax (*Linum usitatissimum* L.) is grown both for its seeds and for its fiber. Various parts of this plant have been used to make medicines. One of the biggest problems in medicinal plants cultivation is damage of weeds. No herbicides are currently labeled for use on sesame and flax, although it is possible that a temporary herbicide use could be allowed under a temporary state registration. Intercropping is an alternative way to reduce the population of weeds [1]. Medicinal and aromatic plants can be successfully grown as intercrops with increased productivity and net income per unit area. In order to investigate the effects of row intercropping of sesame with flax on weeds population, an experiment was conducted at the Agricultural Research Station of Ferdowsi University of Mashhad during spring growing season in 2011. For this purpose a randomized complete block design with three replications and six treatments was used. The treatments included one row of sesame + one row of flax (1:1), two rows of sesame + two rows of flax (2:2), three rows of sesame + three rows of flax (3:3) and four rows of sesame + four rows of flax (4:4) and their monocultures. Weed sampling were done in during of growth season. Then, their dry matters were measured. The results indicated that the highest relative frequency was for wild spinach (*Chenopodium album*) with 10.53-27.27%. Different intercropping patterns affected weed dry matter, the maximum and the minimum weeds dry matter were observed in sole crop of sesame (99.48 and 274.66 gm⁻²) and 2:2 (13.15 and 113.47 gm⁻²), respectively. These findings were consistent with other experiments and suggest that intercropping increased diversity and decreased number, density and population of weeds [2]. In addition, other researchers have noted that intercropping with increasing the light use efficiency of crops can lead to reduced weeds competition ability [3].

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**ANTIBACTERIAL EFFECTS OF WATER AND ALCOHOLIC
EXTRACT OF *RHIZOPOGON ROSEOLUS* MACROSCOPIC FUNGI BY
THE DISC DIFFUSION METHOD**

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Fungi are a group of organisms that are indispensable role in the material cycle in nature. In this study, was tested the effect of antimicrobial water and alcoholic extract macroscopic fungi *Rhizopogon roseolus*. Effect of extract concentration (0.1, 0.2 and 0.3mg/ ml) was investigated by using the disk diffusion method on bacteria *Entrobacter aeruginosa*, *E-coli* *Staphylococcus aureus*. concentrations of certain fungi extracts have antimicrobial effects on microorganisms were effective. Effect of reducing the concentration of the extracts was low. All of the *Rhizopogon roseolus* extract concentrations have inhibitory effects on the growth of gram negative and positive bacteria. But the fungus extract alone showed inhibitory effects on *Staphylococcus aureus*. Results showed that the extract of the fungus *Rhizopogon roseolus* contain compounds with anti-microbial properties. Antimicrobial activity of fungi extracts a way to find new combinations of microorganisms is crucial [1, 2].

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**THE STUDING OF ANTIBACTERIAL PROPERTIES OF WATER AND
ALCOHOLIC EXTRACT OF MACROSCOPIC FUNGUS
*TUBER LATISPORUM***

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Fungi are a group of heterotrophic microorganisms eukaryotic. Today fungal extracts as antimicrobial additives have an important role in maintaining food quality. In this study, antibacterial effects of water and alcoholic extracts of *Tuber latissporum* on 3 pathogenic bacteria (*Salmonella typhimurium*, *Proteus vulgaris* and *Staphylococcus epidermidis*) were tested. Minimum Inhibitory Concentration (MIC), antibacterial properties as the fungal extract eye and by the disk diffusion method and the mean of three experiments was determined for this species. The results showed that most sensitive of the bacterial species was *Staphylococcus epidermidis* in both extracts [1-3].

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THE INFLUENCE OF FENNEL HARVEST TIME ON OMEGA-3 AND OMEGA-6 CONTENTS IN SHOOTS, LEAVES, STEMS AND INFLORESCENCES UNDER AHWAZ CLIMATIC CONDITION

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Fennel (*Foeniculum vulgare* Mill.) is one of the mainly significant medicinal plants, native of Mediterranean regions and belongs to the Apiaceae family. Different fennel parts are widely used in many of the culinary traditions of the world. Polyunsaturated fatty acids from omega-6 and omega-3 families have strong biological properties in low concentrations and are biosynthetic precursors of eicosanoids, which are signaling molecules with complex control over many body systems, having effects on cardiovascular diseases, blood triglyceride level, blood pressure and arthritis. Omega-3 derived from expensive marine sources. This study was aimed to evaluate the influence of different harvest time on the percentage variation of nutritional values, omega-3 and omega -6 contents of different parts of Fennel (shoots, leaves, stems and inflorescences). This experiment was carried out at the medicinal plants farm of the Ramin University of Agriculture and Natural Resources located in Molasani, Ahvaz, Iran, at an altitude of 24 meter above sea level. The sampling design used was completely randomized block with 4 replications and 5 treatments. The treatments were different harvest times. The sowing date was autumn of 2011 (November 13th) and harvested every 18 days, until the complete maturation during one year (total five harvests). The results showed the maximum rate of omega-3 (43.9%) in summer in leaves and omega-6 (40.2%) during the summer in shoots. In conclusion, the best period of time for growing fennel to achieve the highest amounts of omega-3 and omega-6 in shoots is Summer.



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VARIABILITY IN CONCENTRATION OF PHENOLIC ACID
DERIVATIVES AMONG WILD *ZATARIA MULTIFLORA* ACCESSIONS
FROM IRAN

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Zataria multiflora Boiss is an aromatic shrub belonging to the Lamiaceae family and its aerial parts are used in traditional medicine, pharmaceutical and food industries [1,2]. In the present study, the variability of phenolic acid derivatives among 28 wild accessions of the plant was studied. The concentration of phenolic acid derivatives gallic acid (GaA), protocatechuic acid (PA), gentisic acid (GeA), chlorogenic acid (ChA), vanilic acid (VA), caffeic acid (CaA), syringic acid (SyA), *p*-coumaric acid (CoA), salicylic acid (SaA), cinnamic acid (CiA), and rosmarinic acid (RA) have been analyzed by HPLC. Our results revealed that the concentration of RA, the most abundant phenolic acid, ranged from 140.54±0.93 to 759.65±0.84 mg/100g DW. The content in ChA ranged from 0.0 to 18.89±1.85 mg/100g DW, CaA ranged from 0.77±0.01 to 9.14±0.25 mg/100g DW, PA ranged from 0.0 to 5.75±0.10 mg/100g DW, SyA ranged from 0.18±0.01 to 5.70±1.53 mg/100g DW and VA ranged from 0.0 to 3.81±0.07 mg/100g DW. GaA was only detected in the accession of Darab 1 (1.62±0.02 mg/100g DW) and Estahban (1.17±0.06 mg/100g DW). Phenolic acids GeA, CoA, SaA and CiA were not detected in the all samples. For the determination of the phytochemical variability, the phenolic acid components were subjected to cluster analysis (CA). On the basis of phenolic acids all accessions were represented in four groups. The chemical variation between the accessions can be attributed to the environmental and edaphological factors.

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**EFFECTS OF SOLVENT TYPE ON PHENOLICS, FLAVONOIDS AND
SAPONINS CONTENT AND ANTIOXIDANT ACTIVITIES IN
DIANTHUS ORIENTALIS RECH.F.**

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The search of new antioxidants and phenolics from herbal source has taken very large attention in last decade. Secondary metabolites from plants mainly phenolics having antioxidants, antimicrobial, antitumour, antiviral, enzyme inhibiting and radical scavenging properties [1]. Isolation of antioxidant compounds from plant is possible through extraction with different solvents and it depends on the nature of extracting solvents [2]. The extracts from plants contain different classes of phenols, which have the different solubility's in different solvents. Extracts of different polarity (ethanol (70%), water, hexane, ethyl acetate) from aerial parts of *Dianthus orientalis* were investigated for their antioxidant activity. Antioxidant activity determined by 2-2-diphenyl-1-picryl hydrazyl (DPPH) method. Total phenolic (TPC), flavonoid (TFC) and saopnin (TSC) contents were quantified as well. Efficiency of different solvents was compared for the yield of antioxidant extracts from aerial parts sample and a clear variation was observed. The highest TPC, TFC, TSC, DPPH radical scavenging (10.55 ± 0.24 mg ml⁻¹ DW, 3.21 ± 0.14 mg ml⁻¹ DW, 7.23 ± 0.17 mg ml⁻¹ DW, 7.75 ± 0.14 mg ml⁻¹, respectively) were observed in ethanol (70%) extracts. Thus, according to the results extraction yield of phenolic compounds is greatly depending on the solvent polarity. With increased in solvent polarity from hexane to ethanol, amount of phenolic compounds, saponin contents and antioxidant activities increased.

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THE STUDY & COMPARISON OF LEAVES & FRUITES
ANTIOXIDANT ACTIVITY OF *LAURUS NOBILIS.L* (BAY LEAF)

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Medicinal plants have been used for centuries as remedies for human diseases. *Laurus nobilis* is a plant belongs to the family Lauraceous. This plant has been used for much purpose since ancient times and the leaves and the bark are used in various food applications. The present study was carried out to compare the antioxidant activities between the *Laurus nobilis* leave and fruit ethanolic (75%) extracts, The free radical scavenging activity was measured with DPPH (2,2 diphenyl-1-picrylhydrazyl) method. This method was calibrated with Ascorbic acid as common antioxidant. The results showed that the IC₅₀ values of *L. nobilis* leaves, fruits and ascorbic acid were 25.42µg/ml, 51.49µg/ml and 30.50µg/ml respectively. The lower the IC₅₀ values, the higher the antioxidant activities. The IC₅₀ value in *Laurus nobilis* leaves was less than ascorbic acid and also the fruit extract. So the *L. nobilis* leaves exhibit excellent free radical scavenging activity. In conclusion, very considerable antioxidant capacity was observed mainly in leave of *Laurus nobilis* and therefore *Laurus nobilis* leaves and its active constituents may be used in further antioxidative therapy.

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**THE ABILITY OF CALLUS CULTURE OF *SALVIA SAHENDICA* IN
PRODUCTION OF ROSMARINIC ACID**

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In the present study, *in vitro* callus induction and production of rosmarinic acid (RA) in callus culture of *Salvia sahendica* (Lamiaceae), an endemic species which is growing in the northwest of Iran [1], have been studied for the first time. RA is a well known valuable phenolic compound because of its wide spectrum of biological activities such as antimicrobial, anti-inflammatory, antimutagenic, improvement of cognitive performance, prevention of the development of Alzheimer's disease, cardioprotective effects, reduction of the severity of kidney diseases, antioxidant and cancer chemoprevention [2, 3]. Callus induction was achieved from young leaf and intermodal explants cultured on MS [4] medium supplemented with different concentrations of auxins 2, 4-D and NAA (0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 mg/L) solely or in combination with cytokinins BAP and Kin (0.1, 0.5 and 1.0 mg/L). High percentage of callus induction (100%) was obtained in explants cultured on MS medium supplemented with 1.0 mg/L 2, 4-D+0.5 mg/L BAP. The production callus biomass became stable with a growth index of 6 or more after the eight subculture cycles. MS medium supplemented with 1.0 mg/L 2, 4-D plus 0.5 mg/L BAP was also the most favorable medium for callus formation with the greatest fresh weight of callus (0.55 g per explants). Determination and quantification of RA in cultured calli were performed by HPLC UV/ELSD and HPLC UV/MS. Calli those were induced from *S. sahendica* and maintained on supplements of 2, 4-D and BAP in the absence of light produced RA 0.77% based on dry weight (DW). These prepared callus culture provided a useful material for further biotechnological strategies like cell suspension cultures and regulation of RA biosynthesis for enhanced production of valuable phenolic compound on a large scale.

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DETERMINATION AND QUANTIFICATION OF PENTACYCLIC TRITERPENOIDS IN WILD MATURE AND *IN VITRO* REGENERATES OF *THYMUS PERSICUS*: A COMPARATIVE STUDY

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Thymus persicus (Ronniger ex Rech. f.) Jelas is an endemic and valuable natural source of medicinal pentacyclic triterpenoids, *i.e.*, betulinic acid (BA), oleanolic acid (OA) and ursolic acid (UA), which grows in the northwest of Iran [1, 2]. BA, OA and UA are highly valuable compounds because of their wide spectrum of biological activities such as anti-inflammatory, hepatoprotective, antitumor, anti-HIV, antimicrobial, antifungal, anti-ulcer, gastroprotective, hypoglycemic, and antihyperlipidemic [3]. The increasing demand for useful secondary metabolites has intensified the application of biotechnological methods to reproduce high yielding plants under controlled growing conditions and/or to obtain homogenous and stable genotypes. Shoot tip explants, excised from wild growing *T. persicus* was cultured on MS [4] medium supplemented with different plant growth regulators (PGRs). The medium with hormonal formulation produced by far the best condition of shoot proliferation, as it enabled the proliferation of 7.1 ± 0.9 shoots per regenerating explant. The highest shoot formation occurred from cultured on medium supplemented with 2 mg L^{-1} BAP and 0.5 mg L^{-1} NAA. Different MeOH-phosphoric acid-water ratios were initially studied for the HPLC analysis of triterpene acids. Our results revealed that *in vitro* regenerated plantlets of *T. persicus* are also potent in producing of BA, OA and UA as well as their mother plant. High quantity of all acid triterpenes in wild growing mother plant compared with *in vitro* regenerated *T. persicus* plantlets could be attributed to climatic fluctuations and thus may result in inconsistent production of metabolites.

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**ANTIBACTERIAL EFFECTS OF EXTRACTS OF *ALLIUM SATIVUM*
AND *ALLIUM ASCALONICUM* ON *STAPHYLOCOCCUS AUREUS* AND
*SALMONELLA ENTERITIDIS***

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Due to the increasing bacteria's resistance versus antibiotics and their side effects, the use of herbs and plant extracts have received much more attention and they can be used as an harmless alternative to antibiotics. In this study, the antibacterial effects of extracts of *A. Sativum* and *A. Haemanthoides* on these two bacteria, standard Gram-positive and Gram-negative was evaluated. So for this purpose ,after extracting samples from various organs of 2plants with soxhlet, that their compounds by gas chromatography and gas chromatograph connected to a mass spectrometry were identified. The results showed that sequentially there were vinyl dithiins (63.11%), diallyl disulfide (10.88%) and diallyl trisulfide (10.4%) at the highest dose extract of *A. sativum* and 9-hexadecenoic acid (18.09%), 11, 14-eicosadienoic acid (16.24%) and n-hexadecanoic acid (15.26%) is the highest dose extract of *A. Heamanthoides* that were allocated.

Antibacterial effect of the extracts of these 2 plants (50 mg /mL) with Disk method (diffusion in Agar) on the two Gram-negative bacteria *Salmonella enteritidis* and Gram-positive bacteria *Staphylococcus aureus* with diameter measured ,after 24 hour, were studied. Blanch Sterile Disks containing 40 µl of four different dilutions (1.10, 2.10, 4.10 and 8.10) of extracts, that with using both 80% ethanol and 50% DMSO was diluted, expose on the environment Hinton. The results showed that with increase in concentration, increased antibacterial extract's effect, the extract of *A. sativum* highest inhibitory effect on *S. aureus* (in both solvent) and in extracts of *A. heamanthoides* maximum inhibitory effect (26 mm) on *S. enteritidis* and *S. aureus* was observed.

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**COMPARISON OF QUANTITATIVE AND QUALITATIVE
COMPOSITION OF THE ESSENTIAL OIL OF *THYMUS DAENENSIS*
AND *THYMUS FEDTSCHENKOI* IN THE KURDISTAN HABITATES**

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This study for essential oil production survey and identified essential oils compounds of *Thymus fedtschenkoi* and *Thymus daenensis* in Kurdistan habitates of the in 2010 was carried out. In this study, in flowering time plant leaves and stems were harvested and dried at room conditions. The essential oil extracted by water distillation using Clevenger system was performed. By Gas Chromatography (GC) and gas chromatograph connected to a mass spectrometer (GC/MS) Devices, chemical compounds of the essential oil of each species were identified. The results showed that thyme species essential oils have more than 20 different chemical compositions. *Thymus fedtschenkoi* was produced 1.31% essential oil and chemical valuable of thymol with the 62.15 was in the first grade and then composition followed P-cymene (12.03%), gamma - terpinene (6.45%), carvacrol (4.82%) were located. *Thymus daenensis* was produced 2.53% essential oil and thymol with a 70.59%, the highest producing of compounds and gamma - terpinene (8.78%), followed P-cymene (6.11%), carvacrol (3.43 %) were in the lower ranks.

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**OVERCOMING DORMANCY IN SEEDS OF *ALLIUM ALTISSIMUM*:
AN IMPORTANT MEDICINAL PLANT**

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Cultivation, regeneration and conservation of wild plant species are, generally, challenging, mostly due to their seed dormancy and specific germination requirements. *Allium altissimum* (Liliaceae) an important medicinal plant which is also considerable seed germination problem. In order to investigation the effect of mechanical and chemical treatments on seed dormancy and its germination in *A. altissimum*, a completely randomized desing was used with 12 treatments in 4 replication. Treatments included prechilling (4 °C for 1, 2 and 3 weeks), scarification with sandpaper, sulfuric acid (98%) (10, 20 and 30 minutes), .12% KNO₃, combination treatments (2 weeks pre-chilling + .12% KNO₃, 2 weeks pre-chilling + scarification and 2 weeks pre-chilling + sulfuric acid (98%) for 20 min) and control (H₂O). Results indicated that maximum percentage of seed germination (91%) was obtained when treatment of combinations of prechilling for 2 weeks with scarification. The seed coat is as one physical barrier against growth of embryo or radicle that inhibits in absorption of water and gas-exchanges. Therefore, type of dormancy is physical dormancy (PY). Our purpose was to find a practical, easy, and economical method to break physical dormancy (PY) in seeds of *A.altissimum*.



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**ESSENTIAL OIL COMPOSITION OF *ECHINOPHORA ORIENTALIS*
FROM IRAN**

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The genus *Echinophora* is represented in flor of Iran by 4 species: *E. sibthorpiana.*, *E. orientalis.*, *E. platyloba* and *E. cinerea* [1]. *Echinophora orientalis* is a perennial, crowded and much branched herb that reaches to 100 cm in height. This herb has small white flowers integrated in dens umbels with flowering period of Jun-July [2]. The plant is an Irano-Turano element that grows in clay to loam soils. *Echinophora orientalis* distribute from Turkey to Iran and Caucasia [3]. In Iran, the plant distribution limited to west and North West provinces, where the plant named as Khosharizeh and Tologh- Oti, respectively. The aerial parts of *Echinophora orientalis* were used as vegetable for preparation of soup in some parts of Iran. On the other hands, the plant may be used as an animal fodder. In Turkey, as a fragrance agent the plant roots have been added to “helva” a Turkish sweet [4]. The hydrodistilled essential oil composition of air-dried leaves of *Echinophora orientalis* Hedge and Lamond was analyzed by GC-MS. 23 compound; comprising 99.9% of total oil was identified. β -myrcene (32.1%) was the main constituent of oil, followed by α -pinene (16.7%) and p-cymene (14.34%). Our result shows that the oil contains monoterpene (84.82%), cycloalkene (6.38%), aliphatic hydrocarbons (6.2%), oxygnated Monoterpens (2.01%) and aromatic hydrocarbons (0.58%). The comparison of our result with those of baser et al. 1998, showed the essential oil composition profile of *Echinophora orientalis* collected from Iran is similar to those of Eastern Turkey. Thus, it is assumed that two samples of *Echinophora* might be of same chemotype. Due to different bioactivity of β -myrcene, it was assumed that the oil of *E. orientalis* enriched of β -myrcene, might be exhibited various pharmacological and biological properties.

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EXPLORING THE EFFECT OF AROMATHERAPY USING LAVENDER OIL ON THE PATIENTS WITH ISCHEMIC HEART DISEASE IN THE INTENSIVE CARE UNITS (ICUS) OF THE HOSPITALS OF THE CITY OF ISFAHAN IN 2009

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Sleep disorder is regarded as one of the most widespread problems of the inpatients in the Cardiac Intensive Care Units. This disorder is commonly treated with expensive drugs which inevitably have some side effects. Due to its effectiveness and safety, the complementary medicine as an acceptable treatment has now found numerous applications. Aromatherapy is one of the holistic nursing cares on the basis of treatment of the disease using oils extracted from plants. Aromatherapy seems to be effective for treating some health problems such as sleeplessness.

This study was a clinical trial. The research samples included 64 inpatients admitted to the of the Cardiac Intensive Care Units of Al-Zahra and Chamran hospitals situated in the city of Isfahan. To conduct the intervention plan, the treatment group received aromatherapy using *Lavender* essence for a 3-night period for 9 hour. No treatment was administered for the control group. Having 11 items, the sleep quality was assessed using Sleep Hospital Quality Questionnaire. To do so, it was completed before and after the sleep on the third day of the treatment by both test and control groups. Based on the findings of the study, using sniffing aromatherapy with *Lavender oil* positively affects the sleep quality of patients with the Ischemic heart (P value \leq 0.001).As the results indicated, *Lavender* essence is effective for decreasing sleeplessness and increasing sleep quality. However, to validate its positive effects on sleeplessness, more rigorous studies must be carried out.

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**AN INVESTIGATION INTO THE EFFECT OF *CHAMOMILE* ON
DECREASING THE PRE-MENSTRUAL SYMPTOMS IN THE FEMALE
HIGH SCHOOL STUDENTS IN THE CITY OF BUROJEN, IRAN,
IN 2012**

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Pre-menstrual Syndrome is a common health problem which despite many attempts made by the researchers and scientists in this field has still not been completely recognized [1, 2]. Given the high incidence of this disease among young females and the emphasis on discovering non-drug treatments, this study intends to explore whether Chamomile plant can be effective for decreasing the symptoms of pre-menstrual syndrome in the female students of the high schools in the city of Burojen.

This study was of experimental/interventional nature. The population consisted of 80 3-grade high school students selected from those suffering from premenstrual syndrome based on COPE (Calendar of Premenstrual Experiences). They were divided into two groups i.e. control and treatment group. The treatment group received chamomile drops for 3 months during their menstrual period. The data were gathered before and after the intervention by using a questionnaire. As for data analysis, to compare the mean scores for the intensity of the symptoms in the two groups on the one hand and to explore the association between the background variables with the intensity of pre-menstrual syndrome on the other, descriptive statistical methods & independent t-test and ANOVA test were applied, respectively. The findings of the study revealed that using Chamomile drops for three months led to a significant decrease in the intensity of some symptoms of pre-menstrual including physical, depression and anxiety problems ($p=0.001$). In addition, ANOVA test results showed that there was statistically significant relationship between syndrome symptoms and menstrual time length, BMI and regular physical activity. Due to the high incidence of pre-menstrual syndrome and its negative effects on all the aspects of individual's life in terms of family, professional, social and economical aspects on the one hand and the side effects of pain killing drugs on the other, discovering non-drug treatments like plant therapy, sports medicine and relaxation methods have nowadays been taken into consideration. Plant drugs are commonly safe, reliable, cost-effective and accessible; therefore, it is recommended that the health authorities must focus on the approach of using such drugs so as to treat common health problems such as pre-menstrual syndrome.



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**INVESTIGATION OF HABITAT AND DISTRIBUTION OF
DIFFERENT SPECIES OF *THYMUS* GENUS IN IRAN
(KURDISTAN PROVINCE)**

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This study was conducted to evaluate the ecological characteristics and identification of plant species in 6 habitat ranges of Kurdistan for 4 years from 2007 to 2010. Digital data of Kurdistan province were used and topographic position (slope, aspect and altitude), isoclimate, isothermal, isoevaporation and Hypsometry maps drawing and habitats were studied and evaluation of canopy cover, density, phenological stages and regeneration of thyme (*Thymus*) were performed. Results showed that the habitats of Kurdistan, including at least 8 species of thyme includes; *Th. kotschyanus*, *Th. fallax*, *Th. fedtschenkoi*, *Th. pubescens*, *Th. daenensis*, *Th. lancifolius*, *Th. transcaucasicus*, *Th. eriocalyx* are growing, and thyme habitats are outspread in almost all areas of Kurdistan. That habitats with at least 1 thyme species are over than 293000 hectares and most areas located in the north half of the province. *Th. pubescense* in Bijar, *Th. kotschyanus*, *Th. fedtschenkoi* and *Th. fallax* in Divandareh and Sazez are dominant species. The most habitats of thyme are located in 1600-2000 m. altitude, 400-500 mm annual rainfall, 10-12C°. average temperature, mediterranean climates and north & northwest slope directions. Result of soil tests showed that soil acidity (PH), were alkaline(7.07-8.2) and soil electrical conductivity(EC) were (0.31– 0.87ds/m), soil textures except the Bijar (clay loam) were sandy and sandy loam in other habitats. The phenological stages of thyme species related to altitude and temperature were different, in Naserabad and Saheb with lower altitude than other habitats, the beginning of growth occurred in the early March and ended in the early July, while in other habitats the beginning of growth occurred in middle or late March and plants have a longer growing period.

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**KINETICS AND INACTIVATION STUDY OF BITTER MELON
(*CITRULLUS COLOCYNTHIS*) PEROXIDASE IN DIFFERENT
CONDITIONS**

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Data from many laboratories indicate that oxidative reactions are primarily responsible for Alzheimer's, Parkinson's and other neurodegenerative diseases, whereas apoptosis may well be a secondary response to the presence of neurons that have already been severely damaged by oxidative reactions [1]. Specific oxidative reactions within affected neurons led us to propose that one or more heme peroxidases may be the catalyst(s) involved in oxidation of proteins and lipids. Several inhibitors could be ideally suited for targeted clinical approaches aimed at arresting progression of neurodegeneration [1]. Peroxidases (POD) (E.C.1.11.1.7) catalyze the oxidative coupling of phenolic compounds using H₂O₂ as the oxidizing agent and belong to a large family of enzymes that are ubiquitous in fungi, plants and vertebrates. The hydrogen donors may be phenols, amines or other organic compounds and the products that are formed during oxidation depend on the identity of the hydrogen donors [2]. In this study, we studied the peroxidase from the *Citrullus colocynthis* (L.) scharid (bitter melon, cucurbitaceae) grown wild in north of Iran. The activity and kinetics of the peroxidase were determined by using guaiacol as hydrogen donor. The K_m and V_m were 5.5 mM and 0.07 μM/min. The optimum pH and temperature of the peroxidase were obtained 6.5 and 40°C. We have also measured residual enzymatic activity of POD in the presence of various metal ions (Mg²⁺, Cu²⁺, Ca²⁺, K⁺, Fe²⁺) and various reducing and chelating agents.

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**EVALUATION OF ANTIOXIDANT AND FREE RADICAL
SCAVENGING ACTIVITY OF THE *CITRULLUS COLOCYNTHIS* FRUIT
GROWN IN KERMAN PROVINCE**

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Citrullus colocynthis (Cucurbitaceae) is a medicinal plant traditionally used as an abortifacient and to treat constipation, oedema, bacterial infections, cancer and diabetes. Reactive oxygen species (ROS) such as superoxide anions, hydrogen peroxide and hydroxyl, nitric oxide radicals, play an important role in oxidative stress related to the pathogenesis of various important diseases. Antioxidants act as a major defense against radical mediated toxicity by protecting the damages caused by free radicals. Flavonoids and phenolic compounds are widely distributed in plants which have been reported to exert multiple biological effects, including antioxidant, free radical scavenging abilities, anti-inflammatory, anti carcinogenic, etc [1].

In the present study *Citrullus colocynthis* fruits (6 g) in powdered form were extracted with methanol using a Soxhlet assembly for 24h, filtered and last traces of the solvent were evaporated under reduced pressure in a rotary evaporator. The total phenolic content of *Citrullus colocynthis* fruit (CCF) extract was determined according to the method of Singleton [2]. Total phenols amount was 0.11 ± 0.004 mg GAE/g dried matter. Total flavonoid contents were measured with the aluminum chloride colorimetric method[1]. Total flavonoid amount was 20.04 ± 0.005 mg QUE/g dry matter. The ability of extracts to scavenge (IC_{50}) of DPPH radicals was determined 125 ± 0.007 μ g/ ml [3]. It was shown that the antioxidant activities of the methanolic CCF extract were comparable to ascorbic acid and BHT. In view of the potential use of CCF in the health food industry, therefore its therapeutic benefits and bioactive compounds warrant for further investigations.

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EFFECT OF POSTHARVEST TREATMENTS OF PLANT ESSENTIAL OIL ON QUALITATIVE ATTRIBUTES IN APRICOT (*PRUNUS ARMENIACA* CV. ASKARABAD)

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In the present research the effect of postharvest treatments of Origanum essential oil on qualitative attributes of apricot fruits were studied. Fruits were sprayed with different concentrations (0, 300 and 600 µl/l) of Origanum essential oil and were kept for 30 days in cold storage at 0.5-1°C and 85-95 % RH. Qualitative parameters such as pH, titrable acidity (TA), firmness, skin color, antioxidant capacity, weight losses and fruit decay were evaluated [1]. Results showed that weight loss, decay and color changes in treated fruits were lower than control. In addition, Origanum essential oil maintained significantly higher antioxidant capacities compared to the control [2]. Moreover, the level of TA in oil treated fruits was higher than untreated fruits. Evaluation of fruit firmness showed that Origanum essential oil treatments had a good effect on preservation of fruit firmness. According to the results the highest preservative activities was obtained at 600 µl/l concentration. Results revealed that Origanum essential oil is an effective tool for maintaining apricot fruit quality and reducing the occurrence of decay.

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YIELD, CHEMICAL ELEMENTS AND MORPHOPHYSIOLOGICAL TRAITS OF *CALENDULA OFFICINALIS* L. IN RESPONSE TO FOLIAR APPLICATION OF BIO-STIMULATORS IN KARAJ CLIMATE

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To evaluate the correlation relationships between morphological and physiological parameters and chemical elements of Pot marigold (*Calendula officinalis* L.) as affected by foliar application of bio-stimulators, correlation and regression experiments were conducted in 2011. Measured parameters are harvest index, fresh and dry weight of capitula, roots, leaves and total plants, chlorophyll, elements of N, P, K, Fe, Zn, Cu and Mn. Results of correlation in parameters showed that harvest index had significant positive correlation with yield of capitula fresh weight ($r=0.63^{**}$) and yield of root dry weight ($r=0.69^{**}$). Also yield of total dry weight had significant positive correlation with yield of roots dry weight ($r=0.68^{**}$) and yield of leaves fresh weight ($r=0.66^{**}$). Element of Fe had significant positive correlation with K ($r=0.70^{**}$) and Mn ($r=0.77^{**}$) and also Zn with K ($r=0.79^{**}$). In step wise regression on yield of total dry weight as a dependent variable, seven weight parameters of total plant were used in equations. Results of path analyze showed that fresh weight of leaves had the highest positive and direct effect and also indirect effect with dry weight of roots on total dry weight and also among the elements on Fe as a dependent variable, Mn with 0.77% had the most direct effect on uptake of Fe.

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**SIX WEEKS OF AEROBIC EXERCISE AND PEPPERMINT ON
INFLAMMATORY MARKERS AND LUNG FUNCTION AND AEROBIC
POWER**

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Some studies have shown that regular physical activity can improve the performance of the body, including respiratory system. On the other hand, physical activity has been proposed as a cause of bronchospasm. Several preventive and therapeutic strategies to reduce pulmonary ventilation is recommended that the family pepermin antiseptic and anti-inflammatory properties in the treatment of upper respiratory tract catarrh and bronchitis, and are used. Inhaling essential oils of these plants may reduce the asthma attacks. In this context, the aim of this study was to investigate the effect of aerobic training on the volume and lung inflammatory factors and aerobic power in sedentary women who had regular exercise and volunteers took part in. First, subjects and written informed consent form and a health assessment completed questionnaires about asthma and exercise. To this end, 36 subjects in each group aerobic exercise without inhaling peppermint were randomly divided into two groups and homogeneous. In this research, performance indicators, and inflammation (lymphocytes, eosinophils), lung and aerobic capacity of subjects at the beginning and end of the training period, both groups were measured and compared. During the training period, both groups of 80-60 percent of maximum heart rate for aerobic exercise for six weeks, which gradually began without inhaling peppermint. Data were analyzed using ANOVA with repeated measures undertaken and the level of $P \leq 0.05$ was considered significant. maximum expiratory flow (PEF) results within categories of lung function at rest and aerobic power was significant. The results showed no significant difference between groups. The results show that exercise strengthens the respiratory muscles and improve ventilation and increase maximum expiratory flow is followed.

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**AMELORATION OF NON-ALCOHOLIC FATTY LIVER DISEASE
(NAFLD)/NON-ALCOHOLIC STEATOHEPATITIS (NASH) BY
CHICORY SEED EXTRACT VIA MODULATION OF PPAR α AND
SREBP-1**

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Chicory (*Cichorium intybus* L.) is known for having antidiabetic and lipid lowering effects [1]. We evaluated the effect of chicory seed extract (CI) on hepatic steatosis induced by BSA-oleic acid complex (OA) in HepG2 cells (*in vitro*) [2] and by early and late stage diabetes in rats (*in vivo*). Different dosages of CI (1.25, 2.5 and 5 mg/ml) were applied along with OA (1mM) to HepG2 cells, simultaneously and non-simultaneously, and without OA to ordinary non-steatotic cells. Cellular lipid accumulation and glycerol release were measured, and the expression levels of sterol regulatory element-binding protein-1c (SREBP-1c) and peroxisome proliferator-activated receptor alpha (PPAR α) were determined. Liver samples, from our previous study [3], were stained with Hematoxylin and Eosin (H&E). Significant histological damage (steatosis-inflammation-fibrosis) to cells and tissues and down-regulation of SREBP-1c and PPAR α genes that accrued from steatosis induction were prevented by CI in simultaneous treatment. In non-simultaneous treatment, CI up-regulated the expression of both genes to restored normal levels of the corresponding protein. However, CI seemed to act as a PPAR α agonist as its stimulating effect on PPAR α was more noticeable [4, 5]. CI released glycerol from HepG2 cells, and seemed to target the first and second hit phases of hepatic steatosis. A preliminary attempt to characterize CI showed caffeic acid, chlorogenic acid, and chicoric acid, among the constituents [6].

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THE EFFECTS OF SOIL AND FOLIAR APPLICATION OF MOG BIO-FERTILIZER ON MORPHOPHYSIOLOGICAL TRAITS OF MOLDAVIAN BALM (*DRACOCEPHALUM MOLDAVICA*)

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Moldavian Balm (*Dracocephalum moldavica*) is an annual herbaceous aromatic plant belonging to family of Lamiaceae. The seeds of Moldavian Balm are astringent, carminative and tonic. It is commonly consumed as a food-related product, as demulcent in the treatment of fevers and as a herbal preparation because of its reputed medicinal properties. Furthermore, the plant is astringent, tonic and vulnerary. Plant nutrition is one of the most important factor that affect quantity and quality of medicinal compound in plants. In order to meet the ever increasing demand of medicinal plants need to be identified the best fertilizer application strategies. A biofertilizer is a substance which contains living microorganisms which, when applied to seed, plant surfaces, or soil, colonizes the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant. The experiment aimed to investigate the effects of soil and foilar application of biofertilizer (MOG) during different growth stages on morphophysiological and herbal extracts content. The experimental design was a RCB including five fertlizer application treatments (T1= no-application or control, T2= soil application at sowing stage, T3= foilar application when first flowers was observable, T4= soil application at sowing and at 5 to 6 leaf stage, T5= soil application at sowing and at 5 to 6 leaf stage with foilar application when first flowers was observable,) with three replication which was conducted at research farm of College of Agriculture, University of Maragheh, during 2012 growing season. Results revealed that plant height, height of first flowering braches from the ground, number of the secondary branches, number of flowering braches, chlorophyll content, leaf dry matter content, Specific leaf area and herbal extract has been affected by investigated treatment. It concluded that combined application MOG biofertilizer on soil and leaves significantly improved morphophysiological parameter and herbal extract of moldavian balm. If a rapid response is needed to correct a nutrition requirement, a foliar spray with MOG biofertilizer solution may be recommendable. However, soil application of MOG biofertilizer as a more feasible approach can increase the amount available nutrients around plant roots.



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**EFFECT OF MOBILE PHONE RADIATIONS ON MORPHOLOGICAL
AND BIOCHEMICAL PARAMETERS
OF SUNFLOWER SEEDLINGS**

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Over the last two decades an enormous escalation in wireless equipments has been made our lives easy. The uses of wireless accessories including mobile phone have been enabled instant our communication resources advance and fast, on the other hand along with their advantages there is great increase in radiations, an unprecedented type of pollution, in our environment. Current study was an attempt to observe the morphological and biochemical changes induced by cell phone radiations on crops sunflower Seedlings Our results showed that cell phone EMR caused significant reduction in germination percentage, germination rate, but increase root length, fresh weight, dry weight, and relative water contents. Also we concluded that radiations emitted by mobile phone can increase in the contents of proline and protein component.



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**EVALUATION OF PHYTOCHEMICAL AND ANTIBACTERIAL
EFFECTS OF BASIL ESSENTIAL OILS IN HAMBURGER**

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Nowdays, adding food preservatives is one of the methods for increasing shelf-life. Using experimental model and food model is necessary for survey of antibacterial and antioxidant activity as well as preservative effect of essential oils. The aim of this study was evaluation of phytochemical and antibacterial effects of Basil (*Ocimum basilicum*) essential oil in hamburger product. In this experimental study, essential oil of the Basil was isolated by hydrodistillation. The essential oil was analyzed by GC-FID (gas chromatography-flame ionization detector) and GC-MS (gas chromatography/mass spectrometry). Then effect of different concentrations of Basil essential oil (0.00, 0.062, 0.125 & 0.25%), temperatures ($4\pm 1^\circ\text{C}$) and storage time (up to 12 days) was evaluated on anti *staphylococcus aureus* activity in hamburger. The main compounds in Basil essential oil were methyl chavicol (85.19%), 1,8-cineol (3.96%), trans-alpha bergamotene (1.185%), linalool (1.03%) and eugenol (0.7%). The Basil essential oil in storage temperature ($4\pm 1^\circ\text{C}$) decreased growth rate of *staphylococcus aureus* in hamburger ($p < 0.05$). Therefore, this essential oil might be used as an antibacterial agent and natural preservative in meat products such as hamburger.

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INVESTIGATION OF MORPHOPHYSIOLOGICAL TRAITS OF SAVORY (*SATUREJA HORTENSIS* L.) TO FOLIAR APPLICATION OF METHANOL AND BIO-STIMULATORS

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In order to investigate the effects of different levels of methanol and bio-stimulants on many shoot characters of savory (*Satureja hortensis* L.), a factorial experiment based on randomized completely blocks design with three replications in research greenhouse of Institute of Medicinal Plants was carried out. The methanol concentrations in four levels (0, 15, 30, and 45 %v/v) and type of bio-stimulators in four levels (Control, Aminolforte, Fosnutren, and Kadostim; 1.5 liters per hectare for each) were done. The results showed that the interaction of methanol and bio-stimulators had significant effects on leaf fresh and dry weight, number of leaves per plant, chlorophyll content (SPAD), shoot and stem dry weight ($p < 0.01$). Of course, it hadn't significant effect on the amount of essential oil (%). But, the effect of methanol and bio-stimulators on the essential oil ($P < 0.01$) was individually significant. The maximum amount of leaf fresh weight and shoot dry weight in interaction treatment of 15% methanol and Aminolforte, and the minimum amount of mentioned characters in interaction treatment of control and Aminolforte were observed, respectively. The maximum amount of number of leaves per plant in interaction treatment of 30% methanol and Aminolforte, and the minimum amount of forenamed characters in interaction treatment of 30% methanol and control were observed, respectively. The maximum and minimum mean of leaf dry weight was obtained in interaction treatment of 15% methanol and Kadostim, and 30% methanol and Control of bio-stimulators, respectively. The maximum and minimum value of chlorophyll content (SPAD) was related in interaction treatment of 45% methanol and Aminolforte, and control and Kadostim, respectively. The maximum and minimum mean of stem dry weight was seen to interaction treatment in 30% methanol and Kadostim, and control and Kadostim, respectively. Also, the highest and lowest amount of essential oil content was related in 30% methanol and control treatment, respectively. According to the results, foliar application of methanol with bio-stimulators on shoot traits of Savory can be a new technique effective [1,2].

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**INTERACTION OF IRON AND CADMIUM ON GROWTH AND SOME
ANATOMY PARAMETERS *CARUM COPTICOM***

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According to importance of medicinal plants and their efficiency in nature investigation on agricultural various aspects of these plants are important. *Carum copticum* is the most medicinal plant that have thymol [2]. This plant have different application in world. Cadmium is a heavy metal and toxic for plant and human because produced reactive oxygen radicals [1]. In this experiment the effect of differet type of iron (FeCl₃, chelat and nano iron) against cadmium toxicity in hydroponic culture were examined and some morphological and anatomical parameters were studied. Results showed that cadmium reduced growth factors, phloem xylem and colanchyma diameter. But in plants that treated with chelat or nano iron and cadmium these parameters increased especially in nano iron. From this eresearch we concluded that type of iron in culture medium could increased *Carum copticum* resistance against cadmium and nano iron (khazra) wase better treatment in this experiment.

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COMPARISON OF NANO IRON AND IRON CHELATE EFFECT ON
ION CONTENT IN *MELISSA OFFICINALIS* UNDER ALUMINUM
STRESS

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Melissa officinalis is an important medicinal plant in world wide and this plant have antioxidative property [2]. Iron and other nutrients have essential role in the growth and production of secondary compounds in medicinal plant [3]. Aluminum is a heavy metal element and toxic level of this causes oxidative stress in plants and human [1]. In this study the effect of 3 type of iron (FeCl₃, chelat and nano iron). Nano iron produced by Khazra Company on against Al (0 and 50 µm) toxicity were studied. This experiment was carried out in complete randomized design with 3 replicate. This experiment carried out hydroponically. And ion content measured with atomic absorption. Results showed that in plant that treated with Al, Fe²⁺ increased and Ca²⁺ and K⁺ decreased in plants shoot. While Ca²⁺ and Fe²⁺ increased and Mg²⁺ and K⁺ decreased in plants root. However the combined treatment of aluminum and iron, Fe²⁺, Ca²⁺ and Mg²⁺ ions in the iron chelate and nano iron treatments increased in plants shoot and only Mg²⁺ and K⁺ ions in the roots of the results showed. In total applied different treatments of iron significant changes in the ion content can be seen compared to the control group and substitution of iron fertilizer; making by nano technology and iron chelate in comparison with commen iron fertilizers can rise the quantity and quality of growth in *Melissa officinalis* plants.

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**PHYSIOLOGICAL AND BIOCHEMICAL RESPONSES OF MARIGOLD
MEDICINAL PLANT (*CALENDULA OFFICINALIS* L.) TO DROUGHT
STRESS**

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Drought stress is one of the most important factors that limit crop productivity worldwide [2]. For assigning drought stress on biochemical indicators of *Calendula officinalis* L., an experiment was carry out on research farm of Collage of Agriculture at Shahed University in 30 Km of South Tehran region. This study was based on randomized complete block (RCBD) with three replications in 2010-2011. The factors of soil water potentials as drought stress were including: D₁ (Control or applying 0.5 atm as field capacity (FC)), D₂ (potential of 3.5 atm), D₃ (potential of 6.5 atm), and D₄ (potential of 10 atm). The results showed that drought stress had significant effect on all characters ($P < 0.01$), and drought stress changed anthocyanins content, carotenoids content, and soluble sugars, proline content and photosynthetic pigments content. Also, maximum of photosynthesis pigments contents (17.59) were obtained on soil medium stress and proline content in optimum irrigation (0.5 atm) 47 % were lower than hard relatively stress.

In order to cope with water shortage, plants developed several adaptive features at morphological, physiological, biochemical and molecular levels, which permit their continuous growth and survival. In most cases, when osmotic stress is detected, plant's first response is to avoid low water potential by decreasing stomatal conductance and, in long term, by changes in root growth in order to maximize water uptake [3]. As additional tolerance mechanisms, plants must avoid cell dehydration by preventing water loss, via cell wall hardening, or promoting water influx, as a result of active solute accumulation that decreases the osmotic potential, through a process named osmotic adjustment. Plants submitted to water deficit are seriously affected by secondary damages caused by oxidative stress. As previously mentioned, one of the earliest responses aiming water loss avoidance involves stomatal closure, which subsequently down-regulates the photosynthetic machinery due to a decrease in CO₂ uptake [1]. As a consequence, the photosynthetic electron transport chain becomes over-reduced, resulting in the generation of reactive oxygen species (ROS). In plant cells, the excessive production of ROS is potentially harmful to lipids, proteins and nucleic acids, whose oxidation may in turn lead to detrimental effects such as enzyme inhibition, chlorophyll degradation, disruption of membranes integrity, loss of organelle functions and reduction in metabolic efficiency and carbon fixation,amongothers [1].

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**STUDY ON THE EFFECT OF PEPPERMINT ESSENTIAL OILS ON
SOME BACTERIA**

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This study was conducted to determine the effects of peppermint essential oils on *B. cereus*, *S. typhimurium*, *L. monocytogenes* and *Y. enterocolitica*. In the first step, Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of peppermint essential were determined by the tube Dilution Method in the TBS medium. In the second step, the growth behavior of each of bacterium was assessed in presence of peppermint essential oil in concentration of less than MIC. The result of first step showed that *Y. enterocolitica* is more sensitive to peppermint essential oil than other tested bacteria (MIC=0/1% & MBC=0/22%), followed by *L. monocytogenes* (MIC=0/12% & MBC=0/15%), *S. typhimurium* (MIC=0/22% & MBC=0/25%) and *B. cereus* (MIC=0/3% & MBC=5%) respectively. The results of the second showed that, the peppermint essential oils were affected not only on logarithmic phase but on lag phase of growth rate of bacteria.



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**COMPARISON OF ANTIMICROBIAL EFFECT OF ESSENTIAL OIL
OF VITEX AGNUS – CASTUS WITH COMMON ANTIBIOTICS
INVITRO**

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Vitex agnus – castus (VAC) as a plant in herbal medicine has been since centuries ago. It is a phytoestrogenic herb native to the Middle East and southern Europe. It has clinical usage in so many countries. In this research, the antimicrobial effect of essential oil of VAC was investigated on *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans* and was compared with Ampicilin, Gentamicin, Nystatin.

Essential Oil of VAC was extracted by steam distillation, Chemical constituents was analyzed by gas chromatography-mass spectrometry. For evaluation of antimicrobial effect Disk diffusion and Macrodilution methods were used. Essential oil of VAC inhibited the growth of *Staphylococcus aureus* and *Candida albicans* at Concentrations 56/25 µg/mL and 112/5 µg/mL respectively. By Disk diffusion method The inhibitory zones were 10 mm and 11 mm respectively This essential oil inhibited the growth of *Pseudomonas aeruginosa* and *Escherichia coli* at concentration 450 µg/mL. By Disk diffusion method they didn't show inhibitory zone. The major constituents of oil were: Terpinolene, Caryophyllene, α-pinene. The results of this research indicated that the essential oil of VAC has antimicrobial effect, in comparison with antibacterial effect of Ampicilin and Gentamicin has significant difference but this essential oil has equal antifungal effect with Nystatin on *Candida albicans*. So regarding to side effects of chemical drugs perhaps can use of this essential oil as a replacement to control infections that cause by *Candida albicans*.



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**IDENTIFICATION OF OPTIMUM GROWTH IN GREEN
MICROALGAE *TETRASELMIS SUECICA* AND FATTY ACID
COMPOSITION IN DIFFERENT LIGHT AND SALINITY**

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Microalgae *Tetraselmis suecica* including species that are useful in many application in the development of the fisheries and aquaculture industries. Their existences are required and essential at different stage of larval fish production. The purpose of this study is to determine the effect of the light intensity 2500, 4500, 6500 lux and the water salinity 20, 35 ppt on the growth and fatty acid composition of *Tetraselmis suecica* microalgae. The direct effects of light on the quantitative of photosynthesis and biomass production and subsequent synthesis of macromolecular, requires a high level of attention to the lighting conditions at the time of culture microalgae. All the sample were at conway medium and in constant temperature of 25-27 degree centigrade and pH of 7.5 to 8.2, create a growth atmosphere that encouraged the growth of the sample daily. The sample count toward the end of the study showed an exponential phase. The highest cell density was at the light intensity of 6500 lux and the salinity of 20 ppt, which were $314 \pm 20.3 \times 10^4$ cell/ml. The lowest concentration of the cell was at the light intensity of 2500 lux and the salinity of 20 ppt, which were $210 \pm 23.3 \times 10^4$ cell/ml. The analyses of this experiment revealed cell density from 2500 lux to 6500 lux was very significant ($P < 0.05$). Therefore the light intensity increase plays a major role in the growth of *Tetraselmis suecica* microalgae. The result also showed that in most cases among the saturated fatty acid, Palmitic Acid, among mono unsaturated fatty acid, Oleic Acid, among the poly unsaturated fatty acid, alpha-Linolenic Acid and high unsaturated fatty acid, Eicosapentaenoic Acid had the highest percentage. Increasing light intensity caused the rate of fatty acid PUFA, HUFA, Omega 3 and Omega 6 fatty acids also to increase. Overall, this study showed that these microalgae in light intensity of 6500 lux and salinity of 20ppt have produced the highest cell density.

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**EVALUATION OF SEED GERMINATION CHARACTERISTICS
BALANGO (*LALLEMANTIA ROYLEANA*) IN RESPONSE TO
DIFFERENT LEVELS OF TEMPERATURE**

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Balangu (*Lallemantia royleana*) seed is a good source of polysaccharides, fibre, oil and protein and has some medicinal, nutritional and human health properties [1]. Balngo is one of the most important species of medicinal plants of Labiates families that with multiple properties, such as a heart tonic, analgesic, sedative, pain, bloating, constipation, cramps, abdominal approach, dry cough, diarrhea demo, fainting and madness, cooling, and asthma, because of mucilage has an important role in controlling reflux disease [2]. In order to investigate the effect of temperature on the germination characteristics of the medicinal plants Balango (*Lallmantya royleana*), a study was done in Seed Technology Laboratory, Faculty of Agriculture Shahed University, located 30 km south of Tehran. This study was conducted in a completely randomized design in 3 replications in 1391. The examined factors involved temperature levels (19°C, 22°C, 25°C and 28°C). The results showed that the temperature levels had a significant effect on all germination characteristics. So that the highest percentages of germination, germination rate, germination speed and also the lowest mean germination time was reached at 22°C. According to the results, the best temperature for germination of the medicinal plant Balango was 22°C and with increasing temperature from 22 to 25 °C, the germination was highly reduced. The results showed that this plant was sensitive to temperature and its optimum temperature is 22 °C.



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THE EXAMINATION OF THE EFFECTS OF THREE LEVELS OF MYCORRHIZA AND FOUR LEVELS OF CULTIVATION BED ON THE RATE OF SEED GERMINATION, WET AND DRY WEIGHT OF SHOOT TIPS CONTAINING THE EFFECTIVE MATTERS OF *CATNARANTHUS ALBA*

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Catharantus is one of the expensive medic plants that have been addressed by many researchers. Its leaves contain vinblastine and vincristine and its root contains ajmalicine, all three compounds are significantly important. Vinblastine and vincristine are used in chemotherapy for curing different types of cancer and ajmalicine may play a role in increasing blood pressure. The purpose of this study was to examine the effects of different levels of two kinds of biological mycorrhiza manure, *Glomus moseae* and *Glomus intraradices*, and that of four levels of cultivation bed (bed 1 including ordinary soil, bed 2 including soil mixed with decomposed sheep manure, decomposed leaves, and wind sand, bed 3 including soil mixed with vermicompost and bed 4 including soil mixed with compost) on the rate of germination wet and dry weight of shoot tips containing the alkaloids of *Catharantus alba*, in completely randomized block design as factorial in triplicate consisting of 12 treatments.

The effect of three levels of mycorrhiza on the rate of seed germination was examined and no significant effect was observed, while cultivation bed showed a significant effect at 0.1% soil mixed with animal manure (decomposed sheep manure) and decomposed leaves and wind sand showed the greatest effect on the rate of germination. The mutual effects of mycorrhiza and cultivation bed were not significant. Three levels of mycorrhiza had significant effects on wet weight of shoot tips at 5% cultivation bed also had significant effect on wet weight of shoot tips at 1%. The mutual effects of mycorrhiza and cultivation bed on wet weight of shoot tips were not significant. Three levels of mycorrhiza showed significant effect on dry weight of shoot tips at 5%. The effect of cultivation bed was also significant at 1%. The mutual effects of mycorrhiza and cultivation bed on dry weight of shoot tips were not significant.



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**CHEMICAL COMPOSITION AND ANTIMICROBIAL ACTIVITY OF
LEAVES OF *CIRSIUM STRIGOSUM* (M.B.) M.B. *STRIGOSUM***

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The genus *Cirsium* (Compositae) is represented by 28 species in the flora of Iran, including seven endemics [1]. *Cirsium strigosum* (M.B.) M.B. var. *strigosum* (Kangar rishdar) is a species of the genus *Cirsium*, native throughout most of Europe, western Asia (east to the Yenisei Valley), and northwestern Africa (Atlas Mountains). It is also naturalised in North America and Australia and is as an invasive weed in some areas. In this study *Cirsium strigosum* were collected from Khorasan-e-Razavi province, Iran. Chemical constituents of essential oil of leaves of *Cirsium strigosum* were determined. Leaves of *Cirsium strigosum* were subjected to hydrodistillation in a Clevenger – type apparatus until there was no significant increase in the volume of the oil collected. The yield of the oil was 0.23 (w/w %). The essential oil was analyzed by GC and GC/MS. Identification of the components was based on GC retention indices computer matching with Wiley GC-MS library, and by comparison of the fragmentation patterns of the mass spectra with those reported in the literature [2]. 52 components were identified constituting more than 98.1% of the oil. α -Pinene (21.1%), germacrene D (6.1%), β -pinene (5.2%), myrcene (10.0%), β -phellandrene (5.3%), hexadecanoic acid (8.4%), spathulenol (4.3%) and caryophyllene (7.1%) were major components in oil of leaves of *Cirsium strigosum*. The oil was tested against six strains of bacteria (gram-positive and gram-negative). *In vitro* antimicrobial activity of essential oil of leaves of *Cirsium strigosum* was investigated by disc diffusion method and the minimum inhibitory concentration (MIC) and also minimal bactericidal concentration (MBC) determination. The studied sample was active against gram-positive and gram-negative microbial strains.

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**CHEMICAL COMPOSITIONS OF ESSENTIAL OIL OF FLOWER OF
ARTEMISIA KOPETDAGHENSIS FROM IRAN**

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The genus *Artemisia* (*Asteraceae*) is the largest and most widely distributed one of the approximately 60 genera belonging to the tribe Anthemideae. This genus comprises a variable number of species, ranging from 200 to 800, which are predominantly distributed in the northern temperature region of the world in the 0-50 cm precipitation area [1]. Thirty four genera of them are reported in Iran of which two are endemic [2, 3]. *Artemisia kopetdaghensis* is a common perennial herb growing wild in Iran. In this study *Artemisia kopetdaghensis* were collected from Neyshabur area in Khorasan-e-Razavi province, Iran. Chemical constituents of essential oil of flower of *Artemisia kopetdaghensis* were determined. Dried flowers of plant were subjected to hydrodistillation in a Clevenger-type apparatus until there was no significant increase in the volume of the oil collected. The yield of the oil was 0.80% (w/w). The essential oil was analyzed by GC and GC/MS. Identification of the components was based on GC retention indices computer matching with Wiley GC-MS library, and by comparison of the fragmentation patterns of the mass spectra with those reported in the literature [4]. Fifty-four compounds were identified constituting more than 99.2% of the oil. β -Myrcene (3.5%), linalyl alcohol (2.1%), terpinolene (2.5%), camphor (8.7%), (Z)-citral (3.5%), β -citral (12.9%), geranyl acetate (24.1%), and camphene (2.1%) were major components in essential oil of flower of *Artemisia kopetdaghensis*. Amongst them oxygenated monoterpenes and monoterpene hydrocarbons were predominant components.

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**CHEMICAL COMPOSITION OF THE ESSENTIAL OILS OF
OCIMUM BASILICUM L. CULTIVATED IN IRAN**

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There are distinct varieties of basil types in the genus *Ocimum* which makes them very special. Genus *Ocimum* is widespread over Asia, Africa and Central & Southern America. All basil species are members of the Lamiaceae family, including about 200 species [1]. *Ocimum Basilicum* is a condimental plant cultivated in some parts of Iran and frequently used in kitchen, in folk medicine, in pharmacy, in perfumes and cosmetics industry. Basilic herb contains: essential oil, polyphenols, triterpenic acids and phytosterols. The essential oil contains methylchavicol, cineole, fenchol, linalool and methyleugenol [2]. In this study, essential oil of leaves of *Ocimum Basilicum*, collected from Neyshabur in Khorasan Razavi province, Iran, were obtained from dried material harvested during flowering stage, by hydrodistillation. The essential oils were analyzed by gas chromatography-mass spectrometry (GC-MS). 25 compounds were found in oil samples representing 97.3% from the separated compounds. The oil contained linalool as the most abundant component (32.5%), followed by elemene (9.2%), estragol (6.7%), germacrene-D (6.8%), farnesene (5.3%), E-caryophyllene (2.2%) and γ -cadinene (5.4%). The identified compounds were chemically oxygenated monoterpenes (41.2%), monoterpenes hydrocarbons (2.5%), sesquiterpenes hydrocarbons (49.1%), oxygenated sesquiterpenes (2.3%) and aromatic terpenes (2.2%). According to the major compounds in essential oil of *Ocimum* [3], four chemotypes were defined. This plant was categorized in estragol/ linalool chemotypes.

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EVALUATION OF ANTIMICROBIAL ACTIVITIES OF METHANOLIC
EXTRACT OF SEED OF *CITRULLUS COLOCYNTHIS* (L.) SCHARD.
FROM IRAN

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Citrullus colocynthis (L.) Schrad. (Cucurbitaceae), commonly known as ‘bitter apple’, ‘colosynth’, and vine-of-Sodom’ ‘tumba’ or ‘wild gourd’ is a tropical plant that grows abundantly in Iran, and widely in other parts of the world [1]. *Citrullus colocynthis* seeds showed the presence of large amounts of phenolics and flavonoids that have antioxidant activity [2]. *Citrullus colocynthis* had a beneficial effect on improving the glycemic profile without severe adverse effects in diabetic patients. It was used as purgative, anthelmintic, antipyretic, carmanative, cures tumours, leucoderma, asthma, jaundice, enlargement of spleen, tuberculous glands of the neck, elephantiasis and ulcers, also reported that fresh fruit and seeds are eaten as a laxative and removing kidney stones [3]. This study was conducted to determine the *in vitro* antimicrobial activity of methanolic extract of *Citrullus colocynthis*'s seed, collected from Neyshabur, in Khorasan Razavi province, Iran, by disc diffusion method and minimum inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) methods, utilizing six gram positive/ negative microorganism. The extract showed more significant activity against gram (+) bacteria (zones of growth inhibition (24 to 28 mm); MIC/MBC=0.36 to 1.6/0.72 to 5.76 µg/ml) than gram (-) bacteria (zones of growth inhibition (16 to 22 mm) MIC/MBC=5.76 to 12.8/10.24 to 25.6 µg/ml).

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**IN VITRO ANTIMICROBIAL ACTIVITY OF AQUEOUS AND
METHANOLIC AERIAL PART EXTRACTS OF
TRIBULUS TERRESTRIS L. FROM IRAN**

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Tribulus terrestris L. (Zygophyllaceae), called “Khar khasak” in Iran, is an annual herb. This herb as a weed is commonly distributed in agricultural lands as present in ecology naturally. It was found that the plant material collected from different geographical regions have different content of biologically active compounds [1]. This plant contains biological active substances like saponins of the furostanol type (protodioscin and protogracilin), flavonoids, unsaturated fatty acids, vitamins etc. [2-4]. *T. terrestris* powders or extracts have been commonly used in alternative medicine as diuretic, against colic pains, hypertension and hypercholesterolemia for treatment of erectile dysfunction, diabetes, tumours, cardiovascular and respiratory diseases, control of blood pressure [5, 6] and antioxidative effect [7]. This study was conducted to determine the *in vitro* antimicrobial activity of aqueous and methanolic aerial part extracts of *T. terrestris*, collected from mountain of Mashhad, Khorasan Razavi province, Iran, against four gram positive/negative microorganisms by disc diffusion method. Both extract showed maximum inhibition zone against gram (+) bacteria. Methanolic extract showed maximum inhibition zone (21.0 to 27.5 mm) as compared to aqueous extract (16.5 to 20.2 mm).

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**CHEMICAL COMPOSITION OF ESSENTIAL OIL OF FLOWER OF
URTICA DIOICA FROM IRAN**

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The family of nettle, belonging to medicinal plants, is composed of 600 species distributed among 45 genera. *Urtica* is an important genus that with 30 species and *Urtica dioica* L. as a bipod nettle is categorized in this group. Nettle (*Urticadioica*) is widely grown in different parts of the world and has been used to promote health. Numerous analyses of nettle have revealed the presence of more than fifty different chemical constituents. It has been extensively studied and found to contain starch, gum, albumen, sugar, histamine, acetylcholine, choline, serotonin terpenediols, terpenediol glucosides and alpha-tocopherol [1]. In this study *Urtica dioica* were collected from mountain of Bojnord area in Khorasan Shomali province, Iran. Chemical constituents of essential oil of flower of *Urtica dioica* were determined. Dried flowers of plant were subjected to hydrodistillation in a Clevenger-type apparatus until there was no significant increase in the volume of the oil collected. The yield of the oil was 0.09 (w/w %). The essential oil was analyzed by GC and GC/MS. Identification of the components was based on GC retention indices computer matching with Wiley GC-MS library, and by comparison of the fragmentation patterns of the mass spectra with those reported in the literature [2]. Forty four compounds were identified constituting more than 97.5% of the oil. Palmitic acid (4.9%), linoleic acid (46.0%), linolenic acid (5.1%), carvacrol (3.5%), spathulenol (2.0%), β -eudesmol (2.0%), valerenol (3.5%), dibutyl phthalate (2.5%), phytol (4.0%), and (Z) - 9, 17-octadecadienal (3.5%) were major components in essential oil of flower of *Urtica dioica*.

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GC/MS ANALYSIS OF CONSTITUENTS OF ESSENTIAL OIL FROM
STACHYS BYZANTHINA C. KOCH. LEAF
GROWING WILD IN NORTH- EAST OF IRAN

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The genus *Stachys* which belongs to the Lamiaceae family is found in mild regions of the Mediterranean and in southwest Asia. This genus consists of 300 species widespread throughout the world. Among the thirty four species present in Iran, thirteen species are endemic [1, 2]. *Stachys* species also have several folkloric uses, e.g. the leaf of *Stachys byzanthina* is used as a carminative and to relieve headaches [3, 4]. *Stachys byzanthina* C. Koch. or *S. lanata* Jacq is a native plant, it has been known as Sonboleeinoghreei or Zabanbarreh in Iran, which also has been used as an anxiolytic and sedative in Iranian folk medicine. In this study *Stachys byzanthina* were collected from Khrasanshomali province, Iran. Chemical constituents of essential oil of leaf of *Stachys byzanthina* were determined. Leaves of *S. byzanthina* were subjected to hydrodistillation in a Clevenger – type apparatus until there was no significant increase in the volume of the oil collected. The yield of the oil was 0.68 (w/w %). The essential oil was analyzed by GC and GC/MS. Identification of the components was based on GC retention indices computer matching with Wiley GC-MS library, and by comparison of the fragmentation patterns of the mass spectra with those reported in the literature [5]. 52 components were identified constituting more than 97.2% of the oil. α -Pinene (16.1%), germacrene D (5.2%), β -pinene (6.5%), myrcene (8.4%), β -phellandrene (7.5%), hexadecanoic acid (10.5%), spathulenol (5.3%), β -cadinene (5.1%) and caryophyllene (4.1%) were major components in oil of flower of *Stachys byzanthina*.

The oil was tested against six strains of bacteria (gram-positive and gram-negative). *In vitro* antimicrobial activity of essential oil of *Stachys byzanthina* was investigated by disc diffusion method and the minimum inhibitory concentration (MIC) and also minimal bactericidal concentration (MBC) determination. The studied sample was active against gram-positive and gram-negative microbial strains.

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ANTIMICROBIAL ACTIVITY AND CHEMICAL COMPOSITION OF
ESSENTIAL OILS OF LEAVES OF *HYPERICUM HELIANTHEMOIDES*
(SPACH) BOISS.FROM KHORASAN, IRAN

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The genus *Hypericum* L. (Family *Hypericaceae*) consists of over 460 species, which occur in all temperate parts of the world [1, 2]. Seventeen species of them are found in Iran, three of which are endemic [3, 4]. The essential oil obtained by hydrodistillation from the leaves of *Hypericum helianthemoides* (Spach) Boiss. from plants growing wild in Khorasan, Northeast of Iran, were analyzed by gas chromatography (GC) and gas chromatography/mass spectral (GC/MS). In the oil of leaves from *H. helianthemoides* 49 (0.08% w/w) components were identified. Forty nine constituents accounted for 93.3% of the total leaves oil. α -Pinene (12.0%), (Z)- β -ocimene (3.7%), β -copaene (7.2%), β -caryophyllene (10.2%), spathulenol (6.5%) and germacrene D (4.2%) were major components. *In vitro* antimicrobial activity of essential oil of leaf of *H. helianthemoides* were investigated by disc diffusion method and the minimum inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) determination against seven gram positive and gram negative bacteria. The oil was more active against gram positive bacteria. In general, the oil showed moderate activity against all tested microorganisms.

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ANTIMICROBIAL ACTIVITY AND CHEMICAL COMPOSITION OF
ESSENTIAL OIL OF LEAVES OF *HYPERICUM HYSSOPIFOLIUM*
VILL. FROM KHORASAN, IRAN

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The genus *Hypericum* L. (Family *Hypericaceae*) consists of over 460 species, which occur in all temperate parts of the world [1, 2]. Seventeen species of them are found in Iran, three of which are endemic [3, 4]. The essential oils obtained by hydrodistillation from the leaves of *Hypericum hyssopifolium* Vill. from plants growing wild in Khorasan, Northeast of Iran, were analyzed by gas chromatography (GC) and gas chromatography/mass spectral (GC/MS). In the oil of leaves from *Hypericum hyssopifolium* Vill. Forty eight constituents accounted for 95.5% of the total leaves oil. α -Pinene (13.6%), β -pinene (5.0%), β -caryophyllene (3.1%), β -selinene (4.3%), (E)- β -farnesene (6.3%), germacrene D (8.1%), spathulenol (7.3%), β -eudesmol (4.0%) and α -selinene (7.1%) were major components. *In vitro* antimicrobial activity of essential oil of leaf of *Hypericum hyssopifolium* Vill. were investigated by disc diffusion method and the minimum inhibitory concentration (MIC) and also minimal bactericidal concentration (MBC) determination. The oil was tested against six strains of bacteria (gram-positive and gram-negative). The studied sample was active against gram-positive and gram-negative microbial strains.

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**EVALUATION OF CYTOTOXIC EFFECTS OF SECURIGERA
SECURIDACA SEED'S DIFFERENT FRACTIONS ON CANCER AND
NORMAL CELL LINES**

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Securigera is a genus of Fabaceae (papilionaceae) comprises about 6 species in the world. *S. securidaca* (L.) Deg. & Dorf. is one of three species which grows in Iran. The people in the south of Iran used the seeds of *S. securidaca* as a remedy to treat diabetes. Seed of *S. securidaca* had other pharmacological effects like anti-hyperlipidemic, chronotropic and diuretic properties. The phytochemical analysis of *S. securidaca* indicated the presence of flavonoids, alkaloids, saponins, tannins, terpenes, cardiac glycosides and coumarins in seeds. In this study were evaluated the cytotoxicity activities of different fractions of seed extract of *S. securidaca*. The methanol extract of the seed was fractionated with Petroleum ether, chloroform and methanol. Further chromatography was carried out using silicagel and reverse phase silicagel column chromatography for chloroform and methanol fractions yielding 19 and 23 sub fractions respectively. Cell viability was determined by the MTT assay on colon carcinoma (HT-29), colorectal adenocarcinoma (Caco-2) and breast ductal carcinoma (T47D) as cancer cell lines and Swiss mouse embryo fibroblast (NIH/3T3) as normal cell line. Various concentrations (1-200 µg/ml) of drugs including plant fractions and positive control were examined. It was found that some of the fractions demonstrated cytotoxic effects in HT-29 and T47D cell lines. The fractions with IC₅₀ less than 20 µg/ml against the T47D cancer cell lines were C6, C12, C14 and M8. Also C14 and M8 had the same cytotoxic effect on HT29 cancer cell lines. None of the fractions had cytotoxic effect on Caco-2 cancer cell lines. The only cytotoxic activity of the fractions against NIH was observed in C6 (72.18 µg/ml). This result indicates selectivity of the extract of seeds of *S. securidaca* against specific cancer cells and non toxicity to normal cells.



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ESSENTIAL OIL YIELD AND COMPOSITION OF *PELARGONIUM GRAVEOLENS* L. UNDER THIDIAZURON APPLICATION

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Rose-scented geranium (*Pelargonium graveolens* L., family: Geraniaceae) is a highly valued aromatic plants and is the only source of one of the most important essential monoterpene oil(s) called the oil of geranium, which is widely used in the fragrance industry, in aromatherapy and for extraction of commercial rhodinol (mixture of linalool, citronellol, geraniol) [1]. Cell division and differentiation are necessary actions in the secondary plant metabolites biosynthesis. The plant growth regulators appear to play a key role in this process. Thidiazuron (TDZ), an inexpensive and non-metabolized phenyl-urea compound with strong cytokinin-like activity, is known to regulate varied plant responses [2]. Therefore, in this study, we have evaluated the effect of different concentration of TDZ on essential oil yield and composition of *P. graveolens*. Plants were grown in a greenhouse conditions and exposed foliarly to a range of TDZ concentrations (0, 50 and 100 $\mu\text{m.L}^{-1}$), which is applied from beginning flowering phase up to full flowering stage and then harvested for essential oil extraction. The oils were isolated from aerial flowering parts of the plants by hydro-distillation method using Clevenger's apparatus and then subjected to GC and GC-MS analyses to determine the constituents. 26 compounds accounting for 97.1%, 99.5% and 98.1% of the oil were identified in 0, 50 and 100 $\mu\text{m.L}^{-1}$ TDZ, respectively. The oil of *P. graveolens* plants was rich of monoterpenes under all employed treatments. The main oil components identified were citronellol (51.4%, 47.8% and 48.4%), citronellyl formate (11%, 16.3% and 12.9%), geraniol (8.2%, 8.9% and 6.5%), iso-menthone (5.9%, 7.8% and 6.4%), E-caryophyllen (1.2%, 3.3% and 2.9%) and linalool (0.9%, 1.1% and 2%) under 0, 50 and 100 mg.L^{-1} TDZ, respectively. Also, results revealed that application of TDZ in appropriate concentration (50 $\mu\text{m.L}^{-1}$) increased the essential oil yield in geranium by 16% and 42.4%, over the untreated control and high TDZ application, respectively. It is well known that TDZ is commonly used at high concentrations as a defoliant in plant production and at low concentrations for tissue regeneration in culture [3].

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**ANTIMICROBIAL ACTIVITY AND CHEMICAL COMPOSITION OF
FLOWER OF *CIRSIIUM TURKESTANICUM* (REGEL) FROM IRAN**

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The genus *Cirsium* (Compositae) is represented by 28 species in the flora of Iran, including seven endemics [1]. *Cirsium turkestanicum* (Regel) (Kangar Turkestani) is a species of the genus *Cirsium*, native throughout most of Iran, Turkemanestan, Anatoli, Iraq, Ghafghaz, Europe, western Asia, and northwestern Africa. It is also naturalized in North America and Australia and is as an invasiveweed in some areas. In this study, *Cirsium turkestanicum* were collected from Khorasan-e-Razavi province, Iran. Chemical constituents of essential oil of flower of *Cirsium turkestanicum* were determined. Flower of *Cirsium turkestanicum* were subjected to hydrodistillation in a Clevenger – type apparatus until there was no significant increase in the volume of the oil collected. The yield of the oil was 0.18 (w/w %). The essential oil was analyzed by GC and GC/MS. Identification of the components was based on GC retention indices computer matching with Wiley GC-MS library, and by comparison of the fragmentation patterns of the mass spectra with those reported in the literature [2]. 37 components were identified constituting more than 97.1% of the oil. α -Pinene (14.1%), germacrene D (8.0%), β -pinene (5.5%), β -caryophyllen (8.2%), spathulenol (6.2%), palmitic acid (9.9%) and β -elemene (5.2%) were major components in oil of flower of *Cirsium turkestanicum*. The oil was tested against five strains of bacteria (gram-positive and gram-negative). *In vitro* antimicrobial activity of essential oil of flower of *Cirsium turkestanicum* was investigated by disc diffusion method and the minimum inhibitory concentration (MIC) and also minimal bactericidal concentration (MBC) determination. The studied sample was active against gram-positive and gram-negative microbial strains.

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EFFECT OF RED LIGHT AND SEED COAT REMOVING ON SEED GERMINATION OF *KELUSSIA ODORATISSIMA* MOZAFF

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Kelussia odoratissima Mozaff. (Apiaceae) is one of the Iranian endangered plants that have nutritional and pharmacological effects. It is a sweet-smelling plant which has anti-inflammatory, sedative, and anti-tussive properties, and is used to garnish food. This plant grows in the cold winter climate of Central Zagros Mountains, where there are almost 127 days of frost per year at heights of 2500 m. Sowing of seed is the first step in domestication of wild species of medicinal plants. Seeds of *K. odoratissima* often germinate poorly in natural conditions because of dormancy problems. Dormancy is a trait that has likely been acquired during evolution by selection for the ability to survive in adverse environments, such as cold and drought. Light and seed coat are one of the factors affecting on germination. The purpose of this study was to analyze the role of the seed coat and the effect of red light in dormancy and germination of *K. odoratissima* Mozaff. The experiment was undertaken in completely randomized design with three replications, and 25 seeds were tested for each replication. The treatments of dark (control), red light (RL), seed coat removing (SCR) and RL + SCR were tested. RL and RL + SCR showed best effect on percentage seed germination. Shoot length and weight were significantly higher in RL than in other treatments. All treatments were better than control in increasing root length. Also, maximum root length obtained by RL and RL + SCR. Generally, results indicated that seed coat is not effective factor in seed dormancy, while red light was the most effective in inducing germination and the subsequent growth.

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**COMPOSITION OF ESSENTIAL OIL FROM *AEGLE MARMELLOS* PEEL
EXTRACTED BY MICROWAVE-ASSISTED HYDRODISTILLATION
WITH PRE TREATMENT ULTRASOUND**

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In this research, microwave-assisted hydrodistillation (MAHD) with pre treatment ultrasound (45 and 90 min) of essential oils from fresh *Aegle marmelos* peel were used and the results were compared with those obtained by MAHD in terms of extraction yield/efficiency, extraction time, chemical composition and quality of the essential oil. All experiments were performed with at least two replicates. They were done according to GLM method and LSD Test in the SAS software system. The values obtained for essential oil from *Aegle marmelos* was achieved $1.97\pm 0.2\%$ and $2.00\pm 0.2\%$ by MAHD with pre treatment ultrasound (45 and 90 min) and $2.02\pm 0.2\%$ by MAHD. By using GC-MS system the compositions of essential oils extracted were identified. The major component of essential oils obtained by both methods was limonene. There is no significant effect on the yield of essential oil and quality of essential oils extracted by (MAHD) with pre treatment ultrasound as compared to MAHD method.



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**EFFECT OF DIFFERENT EXTRACTION METHODS
(HYDRODISTILLATION AND MICROWAVE-ASSISTED
HYDRODISTILLATION) ON THE EXTRACTION EFFICIENCY AND
ESSENTIAL OIL COMPOSITION FROM *AEGLE MARMELLOS* PEEL**

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Microwave-assisted hydrodistillation (MAHD) is a combination of microwave heating and distillation which is performed in atmospheric pressure. In this paper, MAHD extraction of essential oil from fresh *Aegle marmelos* peel was studied and the results were compared with those obtained by conventional hydrodistillation (HD) technique in terms of extraction yield/efficiency, extraction time, chemical composition and quality of the essential oil. MAHD allows efficient and fast extraction, reduces waste, product quality and permits substantial energy savings. By using GC-MS system the compositions of essential oils extracted were identified. The major components of essential oils obtained by MAHD and HD were limonene (76.3% and 77.5%), followed by γ -terpinene (9.1% and 9.4%), thymol methyl ether (2.2% and 2.2%), sabinene (2.0% and 0.9%), and β -Myrcen (1.7% and 1.7%, respectively). There were no significant differences in the quality of essential oils acquired by the two extraction methods.



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**STORAGE CHANGES IN ESSENTIAL OIL COMPOSITION
OF *THYMUS DAENENSIS* CELAK**

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The changes in quantity and quality of essential oils (EOs) from the aerial parts of *Thymus daenensis* were determined at different temperatures and times storage. The EOs of air-dried samples were obtained by hydrodistillation and analysed by gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). Changes of essential oil composition were detected during storage of *T. daenensis* essential oils for 3 month in refrigerator, freezer and at room temperature. In room temperature the compound with lower boiling temperature such as α -pinene and myrcene were decreased, but the amounts of thymol and carvacrol increased after 3 month.

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**STORAGE CHANGES IN ESSENTIAL OIL COMPOSITION
OF *MYRTUS COMMUNIS* L.**

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The changes in quantity and quality of essential oils (EOs) from the aerial parts of *Myrtus communis* were determined at different storage conditions for three months. The EOs of air-dried samples were obtained by hydrodistillation and analysed by gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). Changes of essential oil composition were detected during storage of *M. communis* essential oils for 3 month in refrigerator, freezer and at room temperature. In refrigerator and freezer, the amount of α -pinene and 1,8-cineole were decreased, but the amounts of limonene and α -terpineol increased. In room temperature the compound with lower boiling temperature such as α -pinene, 1,8-cineole and limonene markedly decreased, but α -terpineol and geranyl acetate markedly increased after 3 month.

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COMPOSITION OF THE VOLATILE COMPONENT OF *VALERIANA FICARIIFOLIA* BOISS. ROOTS USING HEADSPACE/GC-MS

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Valeriana ficariifolia is a member of valerianaceae family, non rhizomatous, roots few and with a distinctive odor. The volatile components from roots of *V. ficariifolia* growing wild in Iran were identified and analyzed by HS (headspace)-GC/MS on the Combi PAL System technique. Twenty-one compounds in the root volatile were identified. The main volatile components of the roots were α -fenchene (42.6%) and α -pinene (27.8%). In addition some compounds such as limonen and linalool was detected in root volatile.

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CHEMICAL CONSTITUENT AND POLYPHENOL COMPOUNDS OF
GAILLONIA ERIANTHA JAUB. & SPACH

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Gaillonia eriantha is a member of family Paederieae (Rubiaceae). The essential oil of *G. eriantha* growing wild in south of Iran was obtained by hydrodistillation and analysed by gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS) and polyphenol compounds were identified by HPLC. Twenty-two compounds were identified in the oil. The major volatile compounds were camphor (14.8%), octyl formate (14.7%), 1,8-cineol (10.9%), n-decane (8.1%), n-undecane (6.8%), n-dodecane (6.1%), n-nonane(5.4%) and α -agarofuran (5.2%). It was found that the predominant phenolic constituents were Chlorogenic acid, Catechin, Caffeic acid, Gallic acid and Coumarin.

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**EXOGENOUS SALICYLIC ACID IMPROVES GROWTH AND
ANTIOXIDANT DEFENSE SYSTEM IN *PHLOMIS TUBEROSA***

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The effects of salicylic acid (SA) on photosynthesis and activities of antioxidant enzymes superoxide dismutase (SOD), ascorbate peroxidase (APX) and catalase (CAT) were investigated in *Phlomis tuberosa* leaves. Foliar application at 10 μmol SA increased significantly net CO₂ assimilation rate, shoot dry weight and levels of chlorophyll. Relative water content (RWC) did not change under SA treatment. Compared with the non-SA treatment, application of SA increased the activities of some antioxidant enzymes: SOD and APX, whereas the activity of CAT did not influence by applying SA compared with those of non-SA treatment. These results indicate that an application of SA was favorable for biomass accumulation of *P. tuberosa* plants under well-watered conditions. However, it did not significantly affect on RWC, but SA-supplemented plants exhibited better protection from oxidative damage because of higher levels of chlorophyll and higher SOD and APX activities [1].

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**EFFECT OF MYCORRHIZA FUNGI AS AN ORGANIC *BIOFERTILIZER*
ON GROWTH AND SOME PHYSIOLOGICAL CHARACTERISTICS OF
CALENDULA
(*CALENDULA OFFICINALIS* L.) AS A MEDICINAL PLANT**

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Arbuscular mycorrhiza fungi (AMF) is one of important and abundant bio-fertilizers, and as a part of soil's biodiversity, make symbiosis with most plant roots for improvement of physiological and morphological properties. An experiment was conducted to assess the effects of AMF (*Glomus intraradices*) on calendula (*Calendula officinalis* L.) with 3 fungal inoculation level (0, 5 and 10%) and 3 replications in a completely randomized design. Results showed that, fungal inoculation led to increasing of vegetative and reproductive parameters, such as root development, flower number, and flower weight. Chlorophyll and carotenoid increased in mycorrhizal plants in comparison to control plants, which are important for reducing of chemical fertilizers application, which are detrimental for health.

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**EFFECT OF DIFFERENT DRYING METHODS ON DRYING TIME,
ESSENTIAL OIL CONTENT AND COLOR CHARACTERISTICS OF
*MENTHA PIPERITA***

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To investigate the effect of different drying methods on drying time, essential oil content and color characteristics (L^* , a^* , b^* , Hue and Chroma) of peppermint, an experiment based on completely randomized design with 10 drying treatments and three replications was conducted and fresh samples used as control. Treatments consist of natural drying (shade and sun drying), oven drying (50 and 70°C), and microwave drying with different power (100, 180, 300, 450, 600 and 900 W). The end time of each treatment determined on the basis of moisture content equal to 0.10 on the basis of dry weight. The results showed a significant effect of different drying methods on the studied traits. The minimum and maximum drying time (5.03 minutes and 9.5 hours) respectively associated with microwave dried (900 w) and shade dried samples. The maximum essential oil content (2.6% and 2.3%) obtained from shade dried and sun dried sample while minimum content in microwave dried sample (300, 450, 600 and 900 W) were observed. The highest amount of chroma and b index related to fresh and sun dried samples while the minimum content related to microwave dried sample (180 w). Color characteristics on fresh sample and sun dried treatment were kept at acceptable level while on some microwave drying treatment these factors were reduced.



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**DROUGHT STRESS AFFECTS ESSENTIAL OIL YIELD IN LEAF,
STEM, INFLORESCENCE AND FLOWERING SHOOT OF
*NEPETA RACEMOSA***

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To study the effect of drought stress on the essential oil content in different parts of *Nepeta racemosa*, this experiment was conducted in 2011 in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experimental design was randomized complete block design with three replications. Drought stress was induced by irrigating the field at 100, 80, 60 and 40% of field capacity (FC), measured by the weighting method. Essential oil was produced by hydrodistillation. Analysis of variance indicated that drought stress significantly affected essential oil yield in leaf, stem, inflorescence and flowering shoot ($P \leq 0.01$). Mean comparison showed that the highest essential oil yield in leaf was achieved in 100% FC (32.23 kg/ha). The highest essential oil yield in stem was achieved in 60% FC (4.16 kg/ha). The highest essential oil yield in inflorescence was achieved in 60% FC (4.073 kg/ha). Finally, the highest essential oil yield in flowering shoot was achieved in 60% FC (7.806 kg/ha).



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**SOLVENT-FREE MICROWAVE EXTRACTION OF ESSENTIAL OIL
FROM *CITRUS LIMON* (EUREKA VARIETY)**

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Essential oils possess various functional properties and hence their applications in pharmaceuticals and nutraceuticals have been developed recently [1]. Distillation is the most commonly method used for commercial production of essential oils [2]. Solvent-free microwave extraction (SFME) is a new technique which combines microwave heating with dry distillation at atmospheric pressure for the isolation and concentration of the essential oils in fresh plant materials. In this research, SFME of lemon essential oil was studied using fresh *Citrus limon* (eureka variety) peel as raw material. The results of SFME and HD were compared in terms of extraction time, extraction yield, chemical composition, physical constants (refractive index, density, and colour), and cost of the operation. To reach the extraction temperature and obtaining the first essential oil droplet, it is necessary to heat for only 3.5 min for SFME compared with 23.0 min for HD. The main reason for this reduced extraction time in SFME method than in HD was the higher pressure gradient formed inside the plant material during microwave heating. In microwave heating, large amounts of interior heating result in increased moisture vapor generation inside the food which creates significant interior pressure and concentration gradient [1, 2]. Also, scanning electron microscopy of *Citrus limon* peel undergone HD and SFME provided evidences of more rapid opening of essential oil glands treated by SFME.

Extraction of essential oils from *Citrus limon* peel with SFME was better in terms of energy saving (0.25 kWh for SFME vs. 0.67 kWh for HD), total extraction time (15 min for SFME vs. 120 min for HD), and essential oil yield (1.26±0.08% for SFME vs. 1.22±0.14% for HD). Regarding environmental impact, the calculated quantity of CO₂ rejected in the atmosphere is higher in the case of HD (451.53 g CO₂/g of essential oil) than that of SFME (158.73 g CO₂/g of essential oil). Although there were no significant differences among physical constants of extracted essential oils, but the color of the essential oil extracted by SFME was lighter. Using GC/MS, components of extracted essential oils were identified. The major component of essential oils extracted by both methods was limonene (57.91±4.09 and 54.61±3.86%, respectively). The SFME is an “environmentally friendly” extraction method, which allows substantial savings of costs, in terms of time, energy and plant materials and appears as a good alternative for the extraction of essential oils from aromatic plants.

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**EFFECT OF DROUGHT STRESS ON LEAF, STEM AND
INFLORESCENCE YIELD OF *NEPETA RACEMOSA***

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To evaluate the effect of drought stress on leaf, stem, inflorescence and total flowering shoot yield of *Nepeta racemosa*, this experiment was conducted at Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experimental design was randomized complete block design with three replications. Drought stress treatment included irrigation at 100, 80, 60 and 40% of field capacity (FC), measured by the weighting method. Analysis of variance indicated that drought stress significantly affected leaf yield, stem yield, inflorescence yield and flowering shoot yield at $P \leq 0.01$. Mean comparison indicated that the highest leaf yield (2556 kg/ha), stem yield (3200 kg/ha), inflorescence yield (2704 kg/ha) and flowering shoot yield (8460 kg/ha) were achieved in the treatment without stress. Results of this experiment generally indicated that increasing the severity of drought stress reduced the value of all four measured traits; leaf yield (1140 kg/ha), stem (1967 kg/ha), inflorescence yield (1600 kg/ha) and flowering shoot yield (4707 kg/ha) were the lowest when irrigation was conducted at 40% FC.



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**EFFECT OF DIFFERENT DRYING METHODS ON SOME
BIOCHEMICAL PROPERTIES OF *MENTHA PIPERITA***

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To investigate the effect of different drying methods on some biochemical characteristics of peppermint including polyphenolic compound, total flavonoids, flavone and flavonones and antioxidant activity, an experiment based on completely randomized design with 10 drying treatments and three replications was conducted and fresh samples used as control. Treatments consist of natural drying (shade and sun drying), oven drying (50 and 70°C), and microwave drying with different power (100, 180, 300, 450, 600 and 900 W). The end time of each treatment determined on the basis of moisture content equal to 0.10 on the basis of dry weight. The results showed a significant effect of different drying methods on the studied traits. The highest antioxidant activity (percentage of radical scavenging activity) related to fresh, sun dried and microwave dried (600 and 900 and 450 w) samples. The maximum amount of polyphenol compound (929.3 mg/g gallic acid) reach at fresh sample and then microwave dried sample (900 w) with (506.4) while the minimum content related to oven dried sample (50°C) with (48.9). Also the highest total flavonoids, flavone and flavonones were observed on fresh and microwave dried sample (900 w) and the minimum amount were observed on oven dried sample (50°C). Totally, microwave dried sample (900 w) and sun dried have truly hold biochemical compound on peppermint plant under drying process.



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**STUDY THE EFFECTS OF TREATMENT TIME WITH SILICON IN
IMPROVING SOME PHYSIOLOGICAL AND BIOCHEMICAL
CHARACTERISTICS OF IRANIAN BORAGE
(*ECHIMUM AMOENUM* FISCH & C.A. MEY)**

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Silicon has beneficial effects on growth, yield and improve tolerance of some plants against biological and abiological stress. In order to study the effect of different concentration of silicon on *Echium amoenum* plant, three levels of silicon (0, 0.2, 0.7 mM as Na₂SiO₃) and two treatment time: Long time (30 days) and short times (15 days) were applied. Borage plant was cultivated in culture medium in green house and it was treated with these levels. The trial was performed in a random – one factors design then some biochemical and physiological parameters in short-term and long-term the silica was reviewed. Content of prolin, Malonyl dialdehyde, total chlorophyll, dry and fresh weight was measured. Results showed that these parameters changed meaningfully and longtime treatment of silicon had better effect on growth of *Echium amoenum*. The results of this study indicated that the appropriate concentration of silicon was 0.2 mM and will prove suitable time for treatment with silicon (30 days) in the Iranian borage plant.



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**EFFECT OF PINCHING ON GROWTH, YIELD AND ESSENTIAL OIL
CONTENT OF *PELARGONIUM GRAVEOLENS* L.**

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Geranium (*Pelargonium graveolens* L.) is a perennial herb belonging to Geraniaceae family. Its' essential oil is extensively used in perfumery, aromatherapy, cosmetics, food and pharmaceutical industries [1, 2]. In order to study the effect of pinching on growth, herb yield, essential oil content and yield of this plant, a greenhouse experiment with pot geranium plants was carried out in Lorestan University, Iran, in 2012. The experiment was done based on a completely randomized design with three treatments and six replications. The treatments were control (no pinching), mild pinching (keeping two nodes on plant) and hard pinching (keeping one node on plant). Results showed that pinching decreased growth characters i.e. total shoot length, number of leaves, leaf area and fresh and dry herb yield. Moreover, as pinching increased, essential oil content and yield decreased. The highest essential oil content and yield (1.5% and 0.298 g plant⁻¹, respectively) were found in control plants. The lowest essential oil content and yield (0.96% and 0.085 g plant⁻¹, respectively) were found in hard pinched plants. It can be concluded from the results that geranium could make enough axillary shoots and leaf area for producing desirable herb and essential oil yield without any need for pinching.

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THE STUDY OF DISTRIBUTION AND ECOLOGY OF MEDICINAL
SPECIES FROM COMPOSITAE (ASTERACEAE) FAMILY IN
BOUSHEHR PROVINCE

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In this research 9 medicinal plant species from asteraceae family have been collected and studied from different areas in the elevation above sea level to 1620 in Boushehr province. The investigated factors includes slope percent, aspect, altitude, the distribution, soil texture, climate, the average annual rainfall, the annual temperature, coverage percent and distribution of plants. The results have been shown that some studies species in this research are the symbol of particular environmental condition and they are growing in particular areas in the Boushehr province. Also the results have been shown that the collected species are in 6 genuses. The most common species are from *Achillea* with 3 species and after that genus of *Anthemis*, *Artemisia*, *Calendula*, *Centaurea* and *Onopordon*. The distribution of *Achillea* is in wide range from the elevation 15 meters above the sea level to 1169. The most distribution in this species related to *Achillea wilhelmsi* and *Achillea millefolium*. Genus of *Achillea millefolium* was collected from the cities Tangestan and Dashtestan and areas with the height 11- 517 meter from the sea level, agronomical scene and medium of yearly rain 250- 300mm also medium of temperature 25-30°C. Although *Achillea wilhelmsi* was collected from Dashtestan and Gam cities with the height of 517- 1169 meter elevation and areas with rangeland landscape also medium of yearly rain 250- 400mm and medium of temperature 20-30°C. The *Anthemis nobilis* was collected from Dashtestan city and areas with the height of 16 meter elevation and *Calendula persica* from the area agronomical landscape. The *Onopordon leptolepis* was collected from Genaveh, Dashtestan and Tangestan, the areas which had 15- 920 meters elevation with agronomical and pasture landscape.



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**GENETIC DIVERSITY ASSESSMENT OF IRANIAN WILD ALMOND
POPULATIONS BY USING INTER SIMPLE SEQUENCE REPEATS**

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Almond (*Prunusdulcis*) is a small deciduous tree belonging to the subfamily Prunoideae of the family Rosaceae; included in the genus *Prunus*, subgenus *Amygdalus*. The genus *Amygdalus* (*Prunus*) is very common in Iran and Afghanistan and throughout the Turco-Iranian area. Almond is not only used as a source of nourishment, but also as a healing and medicinal nut. These nuts are high in nutrients, protein, essential oils such as omega 3, omega 6, vitamin E, vitamin C, zinc, minerals such as phosphorus, manganese, magnesium, calcium and also contain antioxidants. Genetic variation among wild almond populations may provide proper genetic pool to environmental adaptation and improvement of cultivated almond. In this regard, the present study tried to evaluate genetic diversity of wild almond (*P. scoparia*) populations; Qom, Poldokhtar and Jam-Asalooyeh by using ISSR markers. In total, 10 of 20 ISSR loci produced bands. Genetic parameters (Number of effective alleles, Polymorphic Information Content, Shannon index, Nei's gene diversity) between and among populations revealed high genetic variations and suitability of ISSR markers in differentiation of individuals. AMOVA and Fst test showed high genetic diversity among and between three wild almond populations. This study adds up to the knowledge of Iranian almond gene pool and process of genetic divergence among almond populations.



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IMPROVEMENT ON THE SITUATION OF REGENERATION OF
MEDICINAL PLANT *SATUREJA HORTENSIS* L.

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Satureja hortensis L., a well-known medicinal plant, is used as a spice and traditional herb in Iran. The antispasmodic, antidiarrheal, antioxidant, sedative and antimicrobial properties of *S. hortensis* have proved [1,2]. Therefore the attractive alternative source, like Plant cell cultures are needed to propagate *S. hortensis*. The aim of our study is to develop a protocol for *S. hortensis* plantlet regeneration from young spikes, to identify the mediums which have favorable response in tissue culture. Two weeks old *in vitro* germinated seedlings were prepared and Regeneration from hypocotyle and leaves were initiated on MS media supplemented with various combinations of 3-Indol Butyric Acid (IBA) and 6-Benzylaminopurine (BA). The highest percentage of regeneration frequency (41.67) in *S. hortensis* was obtained from hypocotyl explants grown on MS media supplemented with (1.0 mg/L) IBA and (1.0 mg/L) BAP was the best for regeneration of leaves (7.3). The described method can be successfully employed for the large-scale multiplication and conservation of threatened this medicinal plant.

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AN INVESTIGATION ON THE EFFECT OF CURCUMIN ON THE
PEROXIDASE ENZYME

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The Plant products have been used throughout human history and played a pivotal role in the health care of human. Plants contain antioxidants that increase tolerance of body against oxidative stress. Antioxidants are reducing agents like thiols and polyphenols. Among plant polyphenols, curcumin has gained considerable attention in recent years for its multiple pharmacological activities. Curcumin is a polyphenol compound of *Curcuma longa* that commonly known as turmeric. In modern research its therapeutic effect on inflammation, cancer cells and fungal, bacterial and viral pollution has been documented. In addition, its positive effect on treatment of heart diseases, HIV, Alzheimer, epilepsy, rheumatoid arthritis, depression and decreasing blood cholesterol, lipid and glucose has been defined. The mechanism underlying these diverse effects of curcumin is not fully understood. The investigations have indicated that some effects of curcumin are attributed to its interaction with enzymes [1]. In this research, the effect of curcumin on horseradish peroxidase (HRP) as a type of plant peroxidase enzyme has been investigated. The peroxidase enzyme is found in all aerobic cells and eliminates toxic hydrogen peroxide from the cell and decomposes it into O₂ and H₂O [2]. In this investigation, the effect of different concentrations of curcumin on the activity of HRP and its tolerance against oxidative stress was investigated. HRP was assayed by the colorimetric method [3]. Based on the results, the activity of HRP is doubled in presence of 100 μM curcumin indicating this polyphenol compound increases decomposition of toxic hydrogen peroxide remarkably. In addition, the experiments indicated that curcumin improves the tolerance of the plant peroxidase enzyme against oxidative stress remarkably. HRP loses half of its activity, when the concentration of hydrogen peroxide is four times more than the optimum one but, in the same oxidative condition, the enzyme is fully active in presence of 100 μM of curcumin. Consequently, improving the activity and tolerance of the peroxidase enzymes against oxidative stress are two possible mechanisms for the antioxidant effect of curcumin.

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**EFFECT OF CHEMICAL TREATMENTS ON THE GERMINATION OF
FENNEL (*FOENICUHM VULGARE* MILL)**

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Fennel (*Foeniculum vulgare* Mill) depending on the variety is an annual, biennial or perennial plant, belonging to Apiaceae family and is native to the Mediterranean area (1). Experiment arranged in completely randomized design (CRD) with three replications in horticultural laboratory of the agricultural faculty of Guilan University, Rasht, Iran in the autumn of 2011. Seeds were treated for 24 hours in darkness at 25°C in K₂HPO₄ (0.25%, 0.5%, 0.75 %), KH₂PO₄ (0.5%, 1%, 1.5 %), and distilled water (control). Germination tests were made by placing four lots of 25 seeds on single Whatman No. 3 filter papers, moistened with the appropriate solution, or about 7 ml per 25. The covered Petri dishes were held at 25°C and 90% R.H. in a light germination chamber. Germination, assessed by emergence of the radicle, was determined after 3 to 14 days. Germination rate (GR), final germination percentage (GP), mean day germination (MDG), mean germination speed MGS, mean germination time (MGT) and seedling length were calculated. Result showed that in most of the characters the best treatment was priming with K₂HPO₄ 0.75 %. In this study, Maximum germination rate and minimum in K₂HPO₄ 0.75 %, KH₂PO₄ 0.5% observed, respectively.

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**PROTECTIVE EFFECT OF SOME MEDICINAL PLANTS AGAINST
AAPH-INDUCED HEMOLYSIS OF HUMAN ERYTHROCYTES**

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Many plants chemical substances that might have a hemolytic or antihemolytic effect on erythrocytes for example; different antioxidant materials. The use of synthetic antioxidants, however, has been limited because of their toxicity. Therefore, medical researchers have intensified their quest to find natural antioxidants. To investigate the effect of some medicinal plants; *Citrullus colocynthis* (*Cucurbitaceae* family) [pulp extract], *Ilex spinigera* (*Aquifoliaceae* family) [leaf extract], *Ligularia persica* (*Asteraceae* family) [root and flower extract] on red blood cell hemolysis were extracted in MeOH. Blood samples were collected from 8 female volunteers, dissolved and then divided into control and treated groups. The effect of plant extracts on hemolysis was examined at five concentrations (0.25, 0.5, 1, 2.5 and 5 µg/ml). Red blood cell peroxidation was induced using 2, 2'-azo-bis-(2-amidinopropane) dihydrochloride (25mM). Percentages of hemolysis by the measurement of hemoglobin (Hb) released from the cell in the presence and absence of the extracts was determined spectrophotometrically by reading the absorption at 540 nm. In all cases, antihemolytic activity with increasing concentration of the plant extracts increased. The percentages of antihemolytic activity for example in the concentration of 2,5 µg/ml for the plants listed were compared. In addition, IC₅₀ was also calculated for the extracts and were compared. *Citrullus colocynthis* showed the highest inhibitory effect on hemolysis among these extracts. Therefore, these plants can be used as natural antioxidants for the treatment and prevention of disease such as atherosclerosis, cancer, diabetes and liver disease, the pathogenesis of which is mediated by lipid peroxidation.

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**ANTIOXIDANT PROPERTIES AND FREE RADICAL SCAVENGING
ACTIVITY OF *EUPHORBIA AMYGDALOIDES* LEAVES**

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Euphorbia amygdaloides (Family: Euphorbaiceae) is among the large flowering plant families consisting of a wide variety of vegetative forms some of which are plants of great important. *E. amygdaloides* which grows mostly in semi_desert areas Iran and on the Alborz mountains in the Mazandaran [1]. *E. amygdaloides* is traditionally used in the treatment of abdominal troubles, bronchitis, tumours, piles, and enlargement of spleen [2]. Antioxidants are vital substances which possess the ability to protect the body from damage caused by free radical induced oxidative stress. There is an increasing interest in natural antioxidants, e.g., polyphenols, present in medicinal and dietary plants, which might help prevent oxidative damage [4, 5].

The present study was conducted to analysis antioxidant activity of various extracts of *E. amygdaloides* leaves. Water, methanol, ethanol and acetone were used as solvent and antioxidative effects measured by using 2, 2'-diphenyl-1-picrylhydrazyl (DPPH), reducing power and total antioxidant activity assays [3]. The extracts exhibited total phenolic contents ranging from 0.7094 ± 0.03 to 1.2534 ± 0.03 mg GAE/g dry matter and total flavonoid contents ranging from 1.06967 ± 0.03 to 1.3430 ± 0.03 mg QUE/g dry matter. Water proved to be the most effective solvent for extraction of antioxidants from *E. amygdaloides* leaves as it contained the high amount of phenolic (0.7094 ± 0.03 mg GAE/g dry matter). Acetone proved to be the most effective solvent for extraction as it contained the high amount of flavonoid (1.3430 ± 0.03 mg QUE/g dry matter) compounds. The ability of extracts in scavenging of DPPH radical (IC₅₀) were found for water extract, 2.94 ± 0.001 µg/ml and for ethanol extract, 9.27 ± 0.04 µg/ml, for acetone extract, 10.55 ± 0.03 µg/ml and for methanol extract, 21.40 ± 0.02 µg/ml. Therefore, antioxidant activities of *E. amygdaloides* extracts were comparable to ascorbic acid and BHT. It was concluded that the family is a good starting point for plant based medicines.

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EFFECT OF BIOLOGICAL FERTILIZERS ON THE QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF *THYMUS DAENENSIS* MEDICINAL PLANT

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Through the recent years study and evaluation of response of medicinal plants to application of organic and biological fertilizers has become of major importance in new researches. *Thymus daenensis* medicinal plants is one of the 14 endemic species of Iran that in spite of its valuable medicinal properties, there is just a limited number of researches performed in the case of effect of biological fertilizers on this precious medicinal plant. Recent studies have shown that *Thymus* species have strong antibacterial, antifungal, antiviral, antiparasitic, spasmolytic and antioxidant activities. [1,2]. To study the effect of biological fertilizers on the quantitative yield of thyme (*Thymus daenensis*), a field experiment was conducted at an experimental station in Karaj, during the spring season of 2010-2011. The field experiment was laid out in factorial experiment in the base of Randomized Complete Blocks Design, with 3 replications through which the parameters of the height of plantlets, diameter of crown, the lateral shoot numbers, dry/fresh weight, essential oil percentage, and essential oil yield were evaluated. The experimental factors were Nitroxin (Non-inculated= n_1 , Inculated= n_2), Biophosphorus (Non-inculated= b_1 , Inculated= b_2) and Biosulphorus, containing oxidative sulphur bacteria (Application= t_1 , No-application= t_2). Mean comparison was carried out using Duncan multiple range test ($P < 0.05$). Results indicated to a significant difference between applied treatments and control in the case of plants height, crown diameter, the number of lateral shoots, dry/fresh weight as well as yield of essential oil while, treatments showed no significant effect on the essential oil percentage. Study of double and triple interaction of the experiment factors revealed that the gemitate application of mentioned fertilizers was able to enhance the value of most of the studied parameters. The maximum of essential oil yield (8.2 kg/ha) in the treatment of biological nitrogen + biological phosphorus + Biosulphorus ($n_2b_2t_2$) and the minimum of essential oil yield (4.6 kg/ha) in control (no fertilizer treatment) obtained. It seems that biological fertilizers can consider as a replacement for chemical fertilizers in *Thymus daenensis* medicinal plant production.

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**STEVIOL GLYCOSIDES FROM *STEVIA REBAUDIANA* BERTONI
CULTIVATED IN THREE DIFFERENT CLIMATIC REGIONS**

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Demand for non-calorific natural sweeteners in the food and beverage industry has increased the importance of the Stevia plants. In recent years there has been increasing interest in sweet steviol glycosides (SGs) extracted from *S. rebaudiana* (Bert) Bertoni. Amongst the nine known leaf sweetening diterpene glycosides having steviol, stevioside and rebaudioside-A dominate and both display a sweetening capacity >300 times than that of sucrose [1]. Dry and ground leaves extracted in EtOH 70% (v/v), using Erlenmeyer flasks in a shaking hot-water bath for 30 min at 70 °C. After cooling and filtering, the extract was injected in the HPLC model K1001 Knauer equipped with a NH₂-silica column (5µm particle size, 250 × 0.46 mm) and monitored with a Knauer 2501 UV detector [2, 3]. HPLC operating conditions incorporated a mobile phase acetonitrile/water. The UV detector was set to monitor at 210 nm. For quantitation analysis stevioside (98% purity) and rebaudioside A (98% purity) standards were obtained from Ever Stevia Ltd., Canada. Standard solutions were prepared for both stevioside and rebaudioside A in EtOH 70% (w/v) providing a three point calibration curve.

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**EVALUTION ANTIMICROBIAL ACTIVITY OF METHANOL
EXTRACT OF PLANT *ALOE VERA* (XEROPHYTIC) *MARRUBIUM
VULGARE*) AND (*TRACHYSPERMUM AMMI L*) AGAINST STRAINS
OF *STAPHYLOCOCCUS AUREUS* IN THE ANTIBIOTIC-RESISTANT**

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Infections caused by *Staphylococcus aureus* nosocomial of antibiotic resistant strains mainly of origin are hospital. And its prevalence is increasing in many countries. So many efforts to find new compounds as fine alternative to antibiotics has been doing. This study aimed to evaluate the antimicrobial effects of plant extracts of *Aloe vera*, and against *Marrubium Vulgare* and *Trachyspermum ammi L* was in the clinical isolates of *Staphylococcus aureus* resistant. Plant extract doing by using of rotary. 20 samples of *Staphylococcus aureus* was isolated from the nose and throat areas. And faintly MIC (Minimum inhibitory concentrations) and MBC (Minimum Attraction concentrations) was evaluated Plant extracts on *Staphylococcus aureus* in the method Mykrvtitr plate. approximately plant *Aloe vera* extract at a concentration of 0/3-0/62-1/25-2/5 and 5 mg extracts in order to amount 11/76-5/88-35/29-17/64 and 11/76 as MIC It is intended while the approximate 17/64-29/41-58/29-70/35-88/23 and 100 Percent concentrations 0/3-0/62-1/25-2/5-5 and 10 mg plant extract as MBC It is intended Antibacterial effect of plant *Marrubium Vulgare* extracts of to approximate in the concentrations of 1/25 and 2/5 in order to the value 11/76 and 70/58 as MIC intended while the approximate 11/76-82/35 and 82/35 percent they in the approximately 2/5- 5 and 10 mg plant extract as MBC intended and plant *Trachyspermum* extract approximately in the concentration 0/3-1/25 2/5 and 5 mg in order to the value 5/88-23/55-64/70 and 5/88 as MIC intended while approximately 5/88- 5/88-29/41-94/11 and 100 percent in the concentration 0/62-1/25- 2/5-5 and 10 mg as MBC intended .

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**EFFECT OF DIFFRENT LEVELS OF ARTICHOKE POWDER
(*CYNARA SCOLYMUS L*) AND VITAMIN E ON PERFORMANCE OF
JAPANESE QUAIL**

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Artichoke (*Cynara scolymus .L*) is a plant of the Asteraceae (Compositae) family. Artichoke is native to the Mediteranean area which its leaves traditionally have been used by the Eclectic physicians as a diuretic and depurative, for the treatment of rheumatism, jaundice and also to process hepatoprotective and antioxidative properties that are attributed to the phenolic composition. This research was conducted in order to study the effects of Artichoke (*Cynara scolymus L.*) on productive performance of Japanese Quail. 240 day-old Japanese Quails were randomly assigned into four dietary treatments with four replicate pens per treatment (15 birds/pen) in a completely randomized design. Treatment diets were: 1) control diet; 2 and 3) basal diets were supplemented with 2 levels of artichoke (1.5 and 3 gr/100gr diet) and 4) basal diet was supplemented with 300 mg/1kg diet vitamin E. The birds had access to feed and water *ad libitum* and the lighting regimen were continuously monitored from d 1 to 28. Body weight, feed intake and food conversion ratio of Japanese Quails were measured at 14 and 28 days of experiment. The results showed an increase food conversion ratio due to inclusion of Artichoke. Chicks group received 300 mg/1kg diet vitamin E had significantly heavier body weight ($p>0.01$) and greater feed intake throughout the trial.

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ANTIOXIDANT ACTIVITIES OF FRACTIONS FROM DIFFERENT PARTS OF MANGROVE PLANT *RHIZOPHORA MUCRONATA* (LAM.)

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The genus *Rhizophora*, belonging to the *Rhizophoraceae* family consists of about 3 widespread species and 2 hybrids in the world. In Iran, 1 species of this genus, *Rhizophoramucronata* is identified, which is known as “Chandal” in Persian. This plant has many medicinal properties such as anti-bacterial, anti viral, anti diabetic, anti-fungal, anti-cancer, anti-tumor and antioxidant. Free radicals cause many diseases in humans. Antioxidants neutralize free radicals and reduce the risk of cardiovascular disease and ictus. In the other hand antioxidants may inhibit the progression of cancer. Plants are rich sources of phenolic compounds (Flavonoids, tannins and anthocyanins) that are the most important natural antioxidants. The current study aimed at investigating the antioxidant activity of leaf, fruit, root and bark fractions. In so doing, methanol extracts were prepared by soaking method. Obtained extracts by solvent evaporation method and concentration was solved with a little methanol and moved on the column with the stationary phase, silica gel. Washing the column begins with a nonpolar solvent (petroleum ether) and the fractions was separated by gradual increasing of its polarity. Antioxidant activity of leaf, fruit, root and bark fractions was evaluated by free radical scavenging DPPH (2, 2-diphenyl-1-picrylhydrazyl) test. The results indicated that the fraction of root has the maximum antioxidant capacity and the second fraction of fruit has the minimum antioxidant activity. This study may promise some implications for future research [1, 2].

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**EFFECT OF BIOFERTILIZERS ON MORPHOLOGICAL FEATURES
OF *NEPETA RACEMOSA***

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This experiment was conducted to investigate the effect of biofertilizers on *Nepeta racemosa*, a valuable medicinal plant, in 2012 in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experimental design was randomized complete block with three replications. Treatments included (1) control, (2) AM (combination of *Glomus intraradices* + *G. Mosseae* + *G. etunicatum*) + PSM (*Pseudomonas fluorescens*), (3) PGPR (combination of *Azotobacter chroococcum* strain 5 + *Azospirillum lipoferum* strain OF + *Pseudomonas putida* strain 41) and (4) AM + PSM + PGPR. Analysis of variance indicated the significant effect of biofertilizer on morphological features such as plant height, length of the longest internode, main stem diameter, the number of flowering stems, total number of stems, inflorescence length, leaf width and leaf length at $P \leq 0.01$, and the number of non-flowering stems and the number of inflorescence at $P \leq 0.05$. All traits were the highest in AM + PSM + PGPR and the lowest in control. Mean comparison indicated that plant height (63.18 cm), length of the longest internode (7.17 cm), main stem diameter (0.55 cm), the number of flowering stems (82.16), the number of non-flowering stems (49.58), total number of stems (129.08), inflorescence length (10.81 cm), the number of inflorescence (11.78), leaf length (2.57 cm) and leaf width (1.71 cm) were the highest in AM + PSM + PGPR. Result of this experiment showed that all traits were the lowest in the control; indicating that plant growth and yield is affected by a suitable combination of AM, PSM and PGPR application rates.



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**STUDY THE EFFECT OF BIOFERTILIZERS ON SOME OF
CHARACTERISTICS OF MILK THISTLE
(*SILYBUM MARIANUM* L.)**

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Management of the fertilizers application is a key factor for cultivation of medicinal plants [1]. In order to reach this goal, identification of fertilizers compatible with environment and suitable for crops may have desirable effects on the quantitative and qualitative parameters of plants. To study the effect of biological fertilizers on the quantitative yield of Milk thistle (*Silybum marianum* L.), a field experiment was conducted at an experimental station in Fars (Noorabad), during the spring season of 2010-2011. The field experiment was laid out in randomized complete blocks design, with three replications through which the parameters of the height of plant, number of branches per plant, number of inflorescences per plant, inflorescence diameter, number of seed per capitulum, 1000 seed weight were evaluated. Treatments were included: biological nitrogen (n), biological phosphorus (p), biological nitrogen + biological phosphorus (np) and control (no fertilizer treatment). According to the results, the effect of treatments on height of plant and number of seed per capitulum was significant ($P < 0.05$) while it was not significant on number of branch per plant, number of inflorescences per plant, inflorescences diameter and thousand seed weight. The highest height plant (85 cm) and number of seed per capitulum (121) of plants achieved by biological nitrogen + biological phosphorus (np) treatment, whereas control (height of plant 66 cm and number of seed per capitulum 91) ranked at the lowest position. It seems that biofertilizers can consider as a replacement for chemical fertilizers in Milk thistle medicinal plant production.

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**EFFICIENCY OF BIOFERTILIZERS AND CHEMICAL FERTILIZER
ON YIELD AND YIELD COMPONENTS OF DRAGONHEAD
(*DRACOCEPHALUM MOLDAVICA* L.)**

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Fertilizer management is one of the most important factors in successful cultivation of medicinal plants. Fertilizers can affect the quality and quantity of plant indexes. In order to evaluate the Efficiency of biofertilizers and chemical fertilizer on yield and yield components of Dragonhead (*Dracocephalum moldavica* L.), a field experiment was conducted at the research field of agricultural college, Shahed University, located in Tehran, Qom highway in 2011-2012. Randomized complete block design was used including five treatments and three replications. Treatments were biological nitrogen, biological phosphorus, biological nitrogen + biological phosphorus, chemical origin of nitrogen + phosphorus + potassium and control (no fertilizer treatment). Mean comparison was carried out using Duncan multiple range test ($P < 0.05$). According to the results, the effect of treatments on dry matter yield (leaves), seed yield, biological yield, thousand seed weight, harvest index of seed and Plant height was significant ($P < 0.01$). The maximum of seed yield ($33.37 \text{ g}^1 \text{ m}^2$) in the treatment of biological nitrogen + biological phosphorus and the minimum of seed yield ($15.57 \text{ g}^1 \text{ m}^2$) in control (no fertilizer treatment) obtained. The maximum of biological yield ($61.43 \text{ g}^1 \text{ m}^2$) in the treatment of biological nitrogen + biological phosphorus and the minimum of seed yield ($31.64 \text{ g}^1 \text{ m}^2$) in control (no fertilizer treatment) obtained. The maximum of Plant height (67.57 cm) in the treatment of biological nitrogen + biological phosphorus and the minimum of Plant height (57.72 cm) in control (no fertilizer treatment) obtained. It seems that biological fertilizers can consider as a replacement for chemical fertilizers in dragonhead medicinal plant production.

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COMPARISON OF VOLATILE COMPONENTS OF LEAVES AND
FLOWERS OF *CITRUS AURANTIUM* L. USING HEADSPACE/GC-MS

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The genus *Citrus* belongs to Rutaceae family and comprises various species, varieties and hybrids, most of them are found in the north, south and south eastern parts of Iran. *Citrus aurantium*, commonly referred to as bitter orange, has been used for thousands of years in Traditional Chinese Medicine to improve overall health. In this investigation, volatile components of leaves and flowers of *Citrus aurantium* were identified and analyzed by HS (headspace)-GC/MS on the Combi PAL System technique. Results of GC/MS analysis was showed that, 17, 16 volatile compound were identified in the leaf and flower, respectively. The main components of the leaf were Linalool (47.5%), Linalyl acetate (44.0%), (E)- β -Ocimene (2.5%) and Linalool (60.25%), Linalyl acetate (25.78%), Limonene (3.84%), α -pinene (3.29%) were the main compounds of flower.

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EVALUATION OF ESSENTIAL OIL COMPONENTS OF
***LAGOECIA CUMINOIDES* L.**

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Lagoecia cuminoides belongs to the family of Umbelliferae (Apiaceae), and known also as common wild cummin, wild cumin and has been used in the past as a substitute for Cumin and also as a sort of analgesic for such pain as toothache. The aerial parts of *Lagoecia cuminoides* were collected at the flowering stage and dried, then essential oil were obtained by hydro-distillation method using Clevenger apparatus. Its essential oil was analyzed by GC and GC/MS. The analysis of the oil revealed the presence of 28 components identified in the aerial parts of this herb. The main components of the oil were Thymol (56.4%), (E)- β -Farnesene (16.4%), γ -Terpinene (15.6%), p-Cymene (6.34%).

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**EFFECT OF MAGNESIUM SULPHATE OSMOPRIMING ON
GERMINATION AND SEEDLING GROWTH OF *SILYBUM MARIANUM***

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Seedling establishment is a critical step of plant production process and germination stage is considered as important steps of plant growth that environmental stress can affect it. One of advanced methods is seed dehydration technology for dealing with difficult environmental conditions. One of the common techniques of seed dehydration is priming. Effect of osmotic priming was carried out on germination and seedling growth of *Silybum marianum* to find the most suitable conditions including time, priming potential and suitable solution. Germination and seedling growth of *Silybum marianum* was conducted in a factorial completely randomized design with three replications. The first factor was osmopriming solution with five levels (0, 50, 100, 150 and 200 mM), second factor was duration of osmopriming with three levels (8, 16 and 24 h). Results showed that root length in the absence of magnesium had better growing. There was significant difference between concentration, duration and concentration \times duration of MgSo₄ on root length. The highest shoot length was related to control (3.91 mm) and of lowest was related to concentration of 200 mM (1.89 mm), that shoot length had better growing in the absence of magnesium. Also a significant difference was observed between the different concentration treatments and concentration \times duration about shoot length. Maximum root length was significantly related to the control. The highest germination rate was assigned to control and the minimum length is related to the concentration of 200 mM. Germination rate in the absence of magnesium had better growing. Also a significant difference between the different concentrations, time and interaction was observed about germination rate. Data analysis showed significant effect on germination percentage. Time and interaction between time and concentration were significant in priming preparations duration. Based on our results, magnesium sulphate had effect on germination of *Silybum marianum*, but using of distilled water in seed priming of this plant can increase germination percentage and accelerate germination rate [1, 2].

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**EFFECT OF DIFFERENT CONCENTRATIONS NITROXIN AND
PLANT DENSITY ON MORPHOLOGICAL TRAITS AND OIL
HARVEST INDEX IN MEDICINAL PLANT OF ANISE (*PIMPINELLA
ANISUM L.*)**

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In order to evaluate the effect of different concentrations and plant density on oil harvest index of anise, a factorial experiment was conducted in complete randomized block design with three replications at the research farm of the city of Mahabad in 2007-2008. In this experiment concentration of solution containing Nitroxin fertilizer at three levels (0, 3 and 6 L.ha⁻¹) and second factor, plant density at three levels (50, 25 and 12.5 p.m⁻²) was used. Results showed that the effect of plant density on plant height, peduncle length and oil harvest index was significant, but the effect Nitroxin is only in oil Harvest index showed significant differences. Mean comparisons showed that maximum plant height (48 cm) and peduncle length (5.3 cm) and lowest oil harvest index (1.8 %) were obtained from 50 p.m⁻² of plant density. The highest oil harvest index in application 3 L.ha⁻¹ of Nitroxin were that no significant differences between the treatments was 6 L.ha⁻¹ of Nitroxin. Mean comparisons of the interaction showed that application 6 L.ha⁻¹ of Nitroxin, with a density of 25 p.m⁻², maximum number of leaves (19.1) and the same density, application 3 L.ha⁻¹ of Nitroxin, the highest yield of essential oil (134.6 kg.ha⁻¹) were obtained.



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**EFFECTS OF ROSEMARY (*ROSMARINUS OFFICINALIS*) EXTRACT
ON SOME BLOOD PARAMETERS AND IMMUNE SYSTEM OF
MARKHOZ STRAIN NEWBORN KIDS**

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Rosemary (*Rosmarinus officinalis*) extract has been shown to have several biological effects exhibiting anti-inflammatory, antimicrobial and antioxidant activities [1]. This research aimed to evaluate the effects of different levels of rosemary extract (RE) on some blood parameters, immune system and prevention of mortality of Markhoz strain newborn kids. In this study 24 newborn kids were randomly assigned into 4 groups (control diet only with milk, control diet+ 16.6 ml RE/kg BW, control diet+ 33.3 ml RE/kg BW and control diet+ 66.6 ml RE/kg BW) of 6 animals each (3 males and 3 females), homogenous for birth date. Data were analyzed according to a completely randomized experimental design. At the end of the study (d42) blood samples were collected from all kids in each group. Results of data Analysis showed that some hematological parameters such as percentage of neutrophils, lymphocytes and haematocrit value (PCV) and also Red Blood Cells (RBC) numbers and haemoglobin (Hb) concentration were not significantly affected by treatments ($P>0.05$). In blood parameters related immune system as Immune globulins (more IgG) concentration significantly effects observed between control group and treatment including 33.3ml RE/kg BW ($P<0.05$). Experimental treatments had significantly effects on amounts of White Blood Cells (WBC) that increased in treatment including 33.3ml RE/kg BW ($P<0.05$). Results showed that the Rosemary extract could affect some blood parameters, Immunity and livability in treated Markhoz newborn kids.

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**EFFECTS OF ROSEMARY (*ROSMARINUS OFFICINALIS*) EXTRACT
ON GROWTH PERFORMANCE AND CELL-MEDIATE IMMUNE
RESPONSE OF MARKHOZ STRAIN NEWBORN KIDS**

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Natural polyphenols found in leaves of Rosemary (*Rosmarinus officinalis*) have potential therapeutic benefits because of their potent antioxidant activities and their anticancer and antiviral properties [1, 2] This study was conducted to investigate the effects of Rosemary extract (RE) on growth performance and cell- mediate immune response of Markhoz strain newborn kids. Twenty four newborn kids were randomly assigned into 4 groups (control diet only with milk, control diet+ 16.6 ml RE/kg BW, control diet+ 33.3 ml RE/kg BW and control diet+ 66.6 ml RE/kg BW) of 6 animals each (3 males and 3 females), homogenous for birth date and environmental condition. Data were analyzed according to a completely randomized experimental design. body weight and body weight gain of the kids recorded weekly. On days 21 and 42 of kids life, changes in double skin thickness 0, 8, 16 and 24 h after injection of 250 µg of phytohemagglutinin (PHA) were determined as an indicator of cell- mediate immune response. Results showed that body weight, average body weight gain and feed conversion ratio (FCR) were significantly increased in the 33.3ml and 66.6ml groups (P<0.05). Skin thickness were not significantly affected by treatments in day 21 of experiment but injection of PHA in day 42 significantly increased skin thickness of kids in treatments containing 16.6ml and 66.6ml rosemary extract. Rosemary extract administration could improved growth performance in newborn kids and also had an effect at 42 d on skin reaction to phytohemagglutinin suggesting a possible effect on cell- mediate immune response.

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**ANTIOXIDANT PROPERTIES OF DIFFERENT EXTRACTS OF GREEN
TEA AND ROSEMARY**

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Today we know that free radicals in food products have harmful effects on human health so it is vital to use antioxidants. In addition, the use of natural antioxidants instead of synthetic ones has always been the case of most of studies. Different factors such as harvesting time, drying and preparing conditions and extraction conditions like the kind of solvent, temperature and time are effective on the capacity of natural antioxidant. The aim of present study was to compare the antioxidant properties of alcoholic and water extracts of rosemary (*Rosmarinus officinalis*), green tea (*Camellia sinensis*) and BHT as a synthetic antioxidant. To achieve the highest antioxidant properties, sample preparation (drying and extraction) was done in low temperatures. This comparison came through measuring total phenolic content [1], total antioxidant capacity [3], DPPH free radical scavenging ability [3] and reducing power assay [4]. Results showed that methanolic extract of green tea and ethanolic extract of rosemary had higher phenolic content (98.01 and 55.21 mg GA/g freeze dried sample, respectively). Total antioxidant capacity assay showed that ethanolic extract of green tea had the highest total antioxidant capacity in all concentrations used (50, 100, 150, 200, 250 ppm) and even in lowest concentration (50 ppm) this effect was significantly ($p > 0.05$) higher than rosemary and BHT (EC_{50} values for green tea, rosemary and BHT was 66, 54.5 and 101 $\mu\text{g/ml}$, respectively). In DPPH free radical scavenging assay, similar results were achieved and EC_{50} values for ethanolic extract of green tea, methanolic extract of rosemary and BHT were 31.25, 36.84 and 38.46 $\mu\text{g/ml}$, respectively. Although reducing power assay also emphasized on former results about green tea and rosemary extract, but it showed that these extracts are not able compete with BHT in this property. EC_{50} values for this assay were 32, 39.5 and 49 $\mu\text{g/ml}$ for BHT, green tea and rosemary. These results suggested that ethanolic extract of green tea is a powerful natural antioxidant compared to rosemary and can be used instead of the BHT.



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NEUROPROTECTIVE EFFECTS OF *SALVIA CHOLOROLEUCA* LEAVES ALCOHOLIC EXTRACT ON NEURONAL DENSITY OF α -MOTONEURONS AFTER SCIATIC NERVE COMPRESSION IN RATS

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Compression is one of the factors that causes spinal cord cell body degeneration. This degeneration is because of the reversed factors of the damaged area that reached to cell body. *Salvia choloroleuca* is a member of labiatae family [1, 2]. The purpose of this study is to investigate the effect of alcoholic extract of the *Salvia choloroleuca*, on alpha motoneuron degeneration after sciatic nerve injury in rat. Animals were divided into five groups; control; compression; compression + treatment with 25 mg kg⁻¹ alcoholic extract; compression + treatment with 50 mg kg⁻¹ alcoholic extract; compression + treatment with 75 mg kg⁻¹. Extract injection was done intra peritoneally at 2 weeks. 28 days after compression, the Lumbar spinal cord was sampled. The density of α -motoneurons was measured using stereological method. Neuronal density showed meaningful difference in compression and control groups ($P < 0.001$). Neuronal density in treatment groups had a significant meaningful increase ($P < 0.001$) comparing with compression group. Following compression, the generation of free radicals causes apoptosis in neurons. Antioxidants inactivate free radicals and prevent apoptosis. Alcoholic extracts of *Salvia choloroleuca* leaves has increased neuronal density in treatment groups. Then may be this plant has neuroprotective effect.

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THE EFFECTS OF *SALVIA CHOLOROLEUCA* LEAVE ETHYL ASETAT FRACTION ON MOTONEURONS DEGENERATION AFTER SCIATIC NERVE COMPRESSION IN RATS

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After axonal injury the chromatolises was induced that some time Axonal reaction was called. In middle ages, the European traditional medicine scientists were using *Salvia* to cure constipation, pestilence, cold, fever and hepatic malfunction, epilepsy. This plant is useful for stimulating digestion system, cardiovascular system and central nervous system. Also *Salvia choloroleuca* has antioxidant, anti inflammatory, anti viral and anti cancerous effects [1, 2]. The aim of this study is carried out to examine the neuroprotective effects of *Salvia choloroleuca ethyl asetat fraction* on motoneurons degeneration after sciatic nerve compression in rats.

Thirty adult male wistar rats were used and divided to five groups (control, compression, three experimental groups). In compression and experimental groups right sciatic nerve were highly compressed for 60 s, assigned to experimental groups (Compression + *ethyl asetat fraction* of *salvia* leave injections (25 ,50,75mgkg⁻¹, ip, 2 time) (N=6).After 4 weeks post-operative the lumbar segments of spinal cord were sampled, processed, sectioned serially and stained with toluidine blue (pH 4.65). By using stereological quantitative technique, the number of alpha motoneurons in the right horn of spinal cord were counted and compared with each other. Statistical analyses showed remarkable increase in the number of alpha motoneurons in the groups with dosage (50, 75 mgkg⁻¹) in compared to compression (p<0.05). Result shows that *ethyl asetat fraction* has neuroprotective effect on anterior horn motoneurons of spinal cord after sciatic nerve injury in rat.

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**EFFECT OF NANO-ORGANIC IRON CHELATED FERTILIZER AND
IRON SULPHATE ON DRY MATTER YIELD, ESSENTIAL OIL
PERCENT AND ESSENTIAL OIL YIELD OF DAENIAN THYMUS**

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Thyme is a perennial herb of menth family with medicinal importance in the world. *Thymus daenensis* L. is distributed in different habitats of Iran. In order to evaluation of effect of nano- organic iron chelated fertilizer and iron (II) sulfate on dry matter yield, essential oil percent and essential oil yield on *Thymus daenensis* L.an experiment carried out in factorial based on randomized complete block design with three replicates and three levels of nano-organic iron chelated fertilizer (0, 3 and 6 Kg.h⁻¹) and iron (II) sulfate in solution spraying in three times and in 27 rows in 2012 in homand research station of Damavand region. Results of analysis variance showed that the effect of different amounts of nano iron chelated fertilizer and iron sulfate on dry matter yield ($p \leq 0.01$) was significant. The interaction effect of two above fertilizers on essential oil percent and essential oil yield were significant ($p \leq 0.01$ and 0.05, respectively) Whereas, iron sulfate decreased the essential oil yield. The highest level of dry matter yield, essential oil percent and essential oil yield were related to 6 and 3 Kg.h⁻¹ nano-organic iron chelated fertilizer.



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**ASSESSING GROWTH CHANGES AND HYPER ACCUMULATION
POTENTIAL IN CORIANDER (CORIANDRUM SATIVUM L.) UNDER
THREE HEAVY METALS; CADMIUM, LEAD AND NICKEL**

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Organic pollutants and heavy metals is one of the environmental problems and crises around the world. These pollutants cause the soil damage and its fertility and yield loss, because of entering to the food chain, are a serious threat to the health of animals and humans. Phytoremediation is including recommended techniques which with heavy metal accumulation in the plant, facilitates the processes removal of metals from contaminated soils. The aim of this study was evaluation of hyper accumulation potential in coriander plants under heavy metals cadmium, lead and nickel treatments. This experiment was performed in a completely randomized design, with the five combinations (0, 50, 100, 300 and 600 μM) of recent metals in greenhouse under standard conditions. For statistical analysis, we used SPSS software, and comparisons of means were analyzed with the Duncan's multiple range test. Elemental analysis using the method ICP and calculated element concentrations were determined by acid digestion method. In This study, some morphological parameters and photosynthetic pigments of coriander plant were measured. The results showed that the heavy metals treatments, particularly at 300 and 600 μM levels on morphological parameters and total chlorophyll, chlorophyll a, chlorophyll b and carotenoid content were statistically significant, Is due to excessive accumulation of these metals in two mentioned surface than 50 and 100 concentrations. As the concentration by increasing, stem length, fresh weight of root, shoot fresh weight and photosynthetic pigments showed a significant decreasing trend especially higher than concentrations of 100 μM . also with increasing levels of treatments, root length showed increasing trend.

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**EFFECT OF DIFFERENT LEVELS OF N FERTILIZER AND ROW
SPACING ON GROWTH, DEVELOPMENT, OIL CONTENT AND
HERBAGE YIELD OF MOLDAVIAN DRAGONHEAD
(*DRACOCEPHALUM MOLDAVICA* L.)**

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A field experiment was conducted to assay the effect of nitrogen fertilization and row spacing on growth, development, oil content and herbage yield of dragonhead (*Dracocephalum moldavica*) in semi-arid conditions of North East of Iran. The experiment was done at factorial based on randomized complete design with three replications in which factor included four levels of nitrogen fertilization (0, 50, 100, 150 kg/ha) and three levels of row spacing (20, 30, 40 cm). The results showed that the effect of nitrogen fertilization and planting density had significant effect on plant height, number of primary shoot, fresh and dry weight of plant, oil content and herbage yield of dragonhead [1]. The highest plant height, number of primary shoot, fresh and dry weight of per plant was obtained from 40 cm row spacing with 100kg/ha N treatment, while the highest herbage yield was observed in 30 cm row spacing with 100kg/ha N. The highest essential oil content and essential oil yield obtained from 40 cm with 100kg/ha N treatment. In conclusion application of 100 kg/ha N fertilizer with row spacing 40 cm can be recommended for the maximum of herbage and oil yield of dragonhead in this condition.

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**THE STUDY OF MEDICAGO (FABECEAE) SPECIES BASED ON
NUCLEAR RIBOSOMAL DNA ITS SEQUENCES IN IRAN**

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In this study the phylogenetic relationship between annual and perennial species of *Medicago* L. was investigated. A total of 11 taxa representing 6 species of *Medicago* as ingroup and 3 species from related genera as outgroup were included in the phylogenetic analysis. The sequence data was obtained through PCR amplification of the ITS fragment with appropriate primers and using the cycle sequencing reaction run in an automated DNA sequencer. The resulting sequence data was aligned using muscle program. Maximum parsimony approach as implemented in PAUP* using heuristic search strategy and Bayesian method using MrBayes was performed. The analysis showed the perennial species was nested among the annual species and formed a clade, within this clade *M. sativa* and *M. falcata* formed a subclade. *M. scutellata* and *M. radiata* are successive sisters to it. Above mentioned clade along with *M. minima* and *M. orbicularis* were parts of a well supported trichotomy.



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FUMIGANT TOXICITY OF SOME TERPENOIDS OF *ELETTARIA CARDAMOMUM* (ZINGIBERACEAE) SEED ESSENTIAL OILS AGAINST THE INDIANMEAL MOTH

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The Indianmeal moth, *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae), has been considered one of the most serious stored product pests. It can infest a variety of products and is the most economically important insect pest of many stored foods. Current practices for managing Indianmeal moth using chemical fumigants provide only marginal control. The present study reports the use of a plant-based fumigant as an alternative for managing this pest. The toxicity of pure essential oils of *Elettaria cardamomum* Maton (seed) was evaluated by fumigant toxicity bioassay on second and last larval instars in plastic cylinders. *E. cardamomum* (20 $\mu\text{l.L}^{-1}$ air) after 96 hours of fumigation resulted mortality percentage of 25.4 ± 4.92 and 7.96 ± 4.49 in second and last instars, respectively. Results showed that *E. cardamomum* has intermediate fumigant toxicity on the second instar of Indianmeal moth, which is a very destructive life stage of the pest. GC-MS analysis of *E. cardamomum* has been shown that 4-terpineol (30.261%) and 1,8-cineole (25.740%) are the major components whereas other components were found to be α -terpinolene (9.807%), p-cymene (5.300%), α -Terpinene (4.675%) and some other ones [1]. 4-terpineol and 1,8-cineole are the most important monoterpenes in this plant. 1,8-cineole is determined to be the main toxic component in *E. cardamomum* as it has contact toxicity, fumigant toxicity, and antifeedant activity on insects [2]. Nonetheless, 4-terpineol has intermediate toxicity and notable synergy in some of the binary mixtures [3]. In summary, this study demonstrated that *E. cardamomum*, which is used as a traditional spice with a favorable odor, is potent as complementary method with other methods for stored-product pests' integrated pest management.

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**TOXICITY OF PLANT EXTRACT *RUBIA TINCTORUM* IN
COMPARISON WITH THIAMETHOXAM ON GREEN LACEWING
CHRYSOPERLA CARNEA (STEPHENS)**

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One of the most important natural enemies of pests is *Chrysoperla carnea* (Stephens) (Neu.: Chrysopidae). In this research, botanicals extracted from root of *Rubia tinctorum* and thiamethoxam were tested for their toxicity on the green lacewing. Different concentrations were prepared and first instar larva were sprayed by Potter Spray Tower. The experiments were carried out in a complete randomized design with three repetitions and at 25 ± 2 °C , 65 ± 5 RH and photoperiodism of 16:8 h(L:D). The calculated LC₅₀ value for *Rubia tinctorum* extract and thiamethoxam, were 54.22 mg/ml and 9.09 ppm respectively and dosage-response gradient was estimated 1.41 ± 0.21 and 3.57 ± 0.41 respectively at the based on calculated LC₅₀. The results showed that thiamethoxam than *Rubia tinctorum* extract had the highest mortality on first instar larva green lacewing.

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**TOXICITY OF PLANT EXTRACTS *ANIETHUM GRAVEOLENS* AND
FERULA GUMMOSA ON GREEN LACEWING *CHRYSOPERLA CARNEA*
(STEPHENS)**

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The natural products of plants come as an alternative ecologically more compatible in substitution to the synthetic insecticides. In this study, botanicals extracted from seeds of *Aniethum graveolens* and seeds of *Ferula gummosa* were tested for their insecticidal activity on *Chrysoperla carnea* (Stephens) (Neu.: Chrysopidae). Different concentrations of each plant extracts were prepared and first instar larva were sprayed by Potter Spray Tower. The experiments were carried out in a complete randomized design with three repetitions and at 25 ± 2 °C , 65 ± 5 RH and photoperiodism of 16:8 h(L:D). The results showed the calculated LC_{50} value for seeds of *Aniethum graveolens* and seeds of *Ferula gummosa* extracts, were 137.63 and 8.60 mg/ml respectively and dosage-response gradient was estimated 1.72 ± 0.28 and 1.50 ± 0.24 respectively at the based on calculated LC_{50} . The results showed that seeds of *Ferula gummosa* extract than seeds of *Aniethum graveolens* extract had the highest mortality on first instar larva green lacewing.

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**CYTOTOXICITY EFFECT OF ORCHISMASCULATA EXTRACT ON
CANCER CELL LINE**

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Cancer is one of the factors threatening the life is more than a hundred different. Due to lack of effective drugs and expensive medical costs and side effects of anti-cancer drugs, cancer can be one of the causes of mortality. As a result, the current effort to achieve a natural anti-cancer compound that inhibits cancer growth is under investigation. Plants have a special place in the treatment of cancer. Has been estimated to contain 50% of the plants have anti-cancer agents. In this study the effects of plant extracts *Orchismasculata* cytotoxicity on Hela cell line and MCF-7 cell line has been studied. Therefore two classes of cancer cells Hela and MCF-7 (prepared from Pasteur Institute of Iran) in RPMI 1640 medium containing fetal bovine serum and antibiotics were cultured and were in the presence of various concentrations (0.156, 0.312, 0.625, 1.25, 2.5, 5, 7.5 and 10 mg/ml) of the extract *Orchismasculata* and after 72 hours rate of cytotoxicity was determined by using MTT test. These findings indicate that the extract of *Orchismasculata* on MCF-7 cancer cell line had cytotoxicity in all concentrations and the highest inhibition at concentrations of 1.25 mg/ml that is about 79.13%. IC₅₀ rate was 0.468mg/ml and on Hela cell line the highest inhibition at concentrations of 0.156 mg/ml that is about 89.19%. IC₅₀ rate was 1.4 mg/ml. *Orchismasculata* extract was properties cytotoxicity on MCF-7 and Hela cancer cell lines can be used more studies on animal models and subsequent clinical trial studies as a material for cancer treatment.

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**PHYSICOCHEMICAL PROPERTIES OF NATURAL HONEY FROM
ILAM AND ITS EFFECT ON OXIDATIVE STRESS IN
STREPTOZOTOCIN-INDUCED DIABETIC RATS**

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The global prevalence of diabetes mellitus is on the rise. using antioxidant compound in order to prevent and/or delay oxidative stress-dependent degeneration seems to be more logic (1). From the past, honey due to numerous therapeutic properties in the treatment of various diseases has been used. Current study aimed to analyze the physicochemical properties of Ilam honey and its protective effects on oxidative stress on kidneys of streptozotocin-induced diabetic rats. Physicochemical properties of honey were measured according to harmonized methods of the International Honey Commission (Bogdanov, 1999) and National Iranian Standard No. 92 (honey - Specifications and test methods) (2). 24 male rats were randomly divided into 4 groups and treated as follows: C: control group, CH: healthy rats receiving honey, DC: diabetic rats receiving distilled water and DH: diabetic rats receiving honey. Diabetes was induced by intraperitoneal administration of Streptozotocin (65 mg/kg b.w). The honey (1.0 g/kg b.w) was freshly dissolved with distilled water just before each administration. The animals were treated by oral gavage once daily for four weeks. The study showed that honey reducing sugar (72/08%), water (17/50%), fructose to glucose ratio (0/99%), sucrose (1/14%), minerals (0/20%) and free acidity (30), total acidity (33/50), lactones (3/50), pH (4/03), diastase (25/97), HMF (3/40mg/kg), electrical conductivity (0/50), insoluble solids (0/70), Radical scavenging activity (57/25 % inhibition) and Antioxidant activity of 328/32 μ M Fe (II). Diabetic kidneys showed decreased in Malondialdehyde (MDA) levels and Catalase (CAT) activity. Treated with natural honey decreased MDA levels and increased CAT activity in diabetic rats. The above experiments were confirmed the natural and virgin of the honey and its beneficial effects on oxidative stress parameters in kidney of diabetic rats.

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**MOISTURE TRANSPORT IN HAWTHORN (CRATAEGUS
OXYACANTHA) UNDERGOING MICROWAVE- CONVECTIVE
DRYING**

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Hawthorn (*Crataegus oxyacantha*) is a traditional medicinal plant and has long been used as a folk medicine and is widely utilized in pharmaceutical preparations mainly because of its beneficial health effects and its low toxicity. It has been used for the treatment of various cardiovascular diseases, including myocardial weakness, paroxysmal tachycardia, hypertension and arteriosclerosis [1]. Microwave energy offers several advantages compared to conventional heating methods, including speed of operation, energy savings, precise process control and faster start-up and shut down times. However, as microwaves penetrate within a food and generate heat internally, their greater processing interest is the capacity to deliver energy within the product. In thermal processing this means accelerated and more uniform internal heating and thus substantially decreased processing times, which leads to higher product quality as the detrimental effects of high temperatures are minimised. Other benefits include that microwave processing can also help control energy costs, since heating takes place only in the food material being processed and not in the surrounding medium [2]. Drying is one of oldest methods of food preservation. For thousands of years people have been preserving dates figures, apricots, grapes, herbs, carrots, corn, milk, meat, and fish by drying. Generally, the term drying refers to the removal of a relatively small amount of moisture from a solid or nearly solid material by evaporation, which assures microbial stability and guarantees expected shelf-life of the product [3]. Drying characteristics of shelled hawthorn with an initial moisture content of 1.53 dry basis (d.b.) was studied in a fluidized bed dryer assist with microwave heating. Three air temperatures (40, 55 70 °C), three microwave powers (240, 400 and 560 W) and one air velocity (0.4 m/s) were studied. The effective moisture diffusivity, which ranged between 9.29×10^{-10} to $8.81 \times 10^{-9} \text{ m}^2 / \text{s}$ increased with increasing microwave power. Activation energy values were computed between 13.29 and 27.90 kJ/mol.

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**EFFECT OF BERBERIS VULGARIS GRAIN ON SOME BLOOD
PARAMETERS OF BROILER**

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The popularity of herbal drugs is increasing all over the world because of lesser side effects as compared to synthetic drugs. Barberry (*Berberis vulgaris* L. family Berberidaceae), is a shrub with yellow wood and obviate leaves, by oblong red colored fruits. The main constituents reported in this plant are isoquinoline alkaloids such as: berberine, berbamine and oxyaconthine [1]. In Iranian traditional medicine, several properties such as antibacterial, antiemetic, antipyretic, anti-inflammatory, anti-nociceptive, hypoglycemic and hypolipidemic effects has been reported for different parts of *Berberis vulgaris* [1-2]. Moreover Berberine has anti-diabetic properties. It probably act as an α -glucosidase inhibitor, which it is the main mechanism in diabetes treatment [3]. Research showed that Berberislycium added to feed at 20 g kg⁻¹ is effective in improving immunity against ND and IBD as well as liver function in broiler chicks [4]. This study was designed to investigate the effects of different levels of *Berberis vulgaris* grain on some blood parameters (Glucose, Cholesterol, Triglyceride, HDL, LDL in broilers. Two hundred forty one day old male Ross broiler chicks in a completely randomized design with 5 treatments and 4 replicates per treatment, and each replicate consisted of 12 chicks were raise until 42 days of age. In this experiment, were used of difference level of *Berberis vulgaris* (0, 1, 2, 3, and 4%). The lowest level serum cholesterol and glucose in between treatments, was observed in the chicks that were fed with 3% of *Berberis vulgaris* (p<0.05). HDL level serum of broiler chickens fed with 4% the barberry seeds was significantly higher than other chicks (p<0.05). No significant effect was observed in serum LDL levels in broilers (p>0.05).

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**STUDY ON THE EFFECT OF THE “ETHANOL” AND ESSENTIAL OIL
OF MEDICINAL PLANTS “SATUREJA HORTENSIS” ON POST-
HARVESTING QUALITY OF DAVOODI CUT FLOWERS WHITE
ENGINEERING NUMBER**

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The Essential oil of medicinal plants has very strong anti-bacteria and anti-fungus effects [1, 2]. In order to study the effect of ethanol and Essential oil of medicinal plant “*Satureja hortensis*” on increase of the vase life of Davoodi cut flower (white engineering number), a research was carried out on an accident plan at gardening group Laboratory, College of agriculture, Abhar branch, Islamic Azad University in fall 1390. In this research, the effect of Essential oil of medicinal plant “*Satureja hortensis*” was investigated in two levels 50 and 100 milligram/liter with sucrose 4% and without sucrose and ethanol 2% and 4% as preservative solution, using the combinations on a long-term basis. The results indicated that vase life, relative solution absorption and the chlorophyll index in Davoodi cut flowers are affected by the “ethanol” and “*Satureja hortensis*” Essential oil. The average vase life of the flowers which have used distilled water as witness was 16 days, while the average vase life of the flowers which have used essence of savory in the amount of 100 milligram/liter with sucrose was 24 days which had the highest effect in increase of vase life compared with the distilled water. The highest amount of solution absorption and the chlorophyll index was seen in the case of 100 milligram/liter *Satureja hortensis* Essential oil with sucrose, which increased vase life of the flower 1.5 times the witness.

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**ESSENTIAL OIL YIELD AND COMPOSITION CHANGES IN
KELUSSIA ODORATISSIMA MOZAFF USING DIFFERENT DRYING
TREATMENTS**

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Kelussia odoratissima Mozaff is one of the latest species of the Umbelliferae family that is used as food supplement and medicine [1]. *Kelussia odoratissima* is well documented as an antioxidant-rich salad crop that contains several aromatic and biologically active compounds [1,3]. The effect of six different drying treatments (sun, microwave, shade, oven 45° C, oven 65° C and freeze – drying) on the content and chemical composition of *K. odoratissima* leaves was assessed. The essential oils from fresh and dried samples were isolated by hydrodistillation in a Clevenger apparatus and analyzed using gas chromatography-mass spectrometry (GC-MS). The major compound of the oil was Z-ligustilide [2]. Results showed that oven and shade drying have increased the essential oil yield, significantly. Moreover, these methods lead to an increase in Z-ligustilide and E-ligustilide. These results allowed considering this method of drying as the method that produced the best results in terms of essential oil and bioactive compounds content.

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**THE EFFECT OF CARVACROL AND THYMOL ON INCREASE OF
LIFETIME OF DAVOODI CUT FLOWERS WHITE ENGINEERING
NUMBER**

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Carvacrol and thymol are among phenyl combinations which have very strong anti-bacteria and anti-fungus effects [1-3]. In order to increase vase life of Davoodi cut flowers (white engineering number), a test was carried out on an accident plan at gardening group Laboratory, College of agriculture, Abhar branch, Islamic Azad University in fall 1390, using thymol and carvacrol as anti-microbe agents. The effect of thymol and carvacrol was investigated in two levels of 25 and 50 milligram/liter, with sucrose 4% and without sucrose as preservative solution, and Davoodi cut flowers were given these combinations on a long-term basis. The average vase life of the flowers which used distilled water as witness was 16 days, while the average vase life of the flowers which used carvacrol in the amount of 50 milligram/liter with sucrose was 28 days and that of the flowers which used thymol in the amount of 25 milligram/liter was 18 days, which showed longest and shortest vase life respectively. According to the results, the highest fresh weight was seen in seventh day of test in the case of carvacrol in the amount of 50 milligram/liter with sucrose, which showed improvement 1.75 times the witness. With respect to electrolyte leakage, the lowest amount of 22.1% was seen in the case of carvacrol in the amount of 50 milligram/liter with sucrose. In addition, the amount of relative solution absorption was measured in comparison with witness. The results indicate that carvacrol is a new substitute in preservative solutions and commercial use of these compounds require complementary tests.

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INTRODUCTION OF MEDICINE PLANTS IN ASADLY OF BOJNOURD

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Asadly village located 20 km south of Bojnourd at 57 ° 35 'North longitude and 37 ° 29' East latitude. Minimum and maximum altitude of 1990 - 1700 meter. The average annual rainfall is about 336 mm and annual temperature of around 8.6 Celsius. This area was located in is mostly Iranian –Turanian region. The aim of this research was introduction of flora and medicine plants and chorotype. Samples were collected during May - August 2012. They were identified using Flora of Iran and Flora Iranica. Among the 29 identified families, 17 families were medicine plants including: Salicaceae, Papaveraceae, Fumariaceae, Brassicaceae, Compositae, Geraniaceae, Violaceae, Plantaginaceae, Convovulaceae, Solanaceae, Lamiaceae, Fabaceae, Iridaceae, Rosaceae, Boraginaceae, Resedaceae, Scrophulariaceae. 64.7% families were applied for digestive problems, 29.41% for respiratory problems, diuretic and tonic, and other families used for hypnotics, anti-inflammatory, analgesic, astringent used.

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THE PREDICATION OF GARLIC (*ALLIUM SATIVUM* L.) DRYING RATE (DR) AND MOISTURE RATIO (MR) USING A NEURAL NETWORK METHOD

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Garlic (*Allium sativum* L.) is an important crop in the world. Due to its therapeutic properties it has been cultivated in many countries. Garlic is also usually used as a flavoring agent; it may be used in the shape of powder or granule as a valuable condiment for foods. When the garlic bulb is cut or split, pungency of flavor is diffused, while fresh garlic bulb has no distinct pungency [1]. During a drying process, heat and mass transfer normally occur simultaneously. Suitable knowledge and control of mass transfer are essential to both the quality of the product and the economics of the process. The difficulties of applying moisture diffusivity phenomena theory to food processes arise from the complex physical structure and composition of foods, which may vary even within the same food sample and may change during processing [2]. ANNs is one of the soft computing approaches. It is constructed from simple processing units named neurons. ANNs discovers the relationships between input and output parameters through learning process. By use of this method a mapping is created between input and output variables. Input data processing is carried out in hidden and output layers. Training process of network, finally terminates to learning. Many experimental patterns can be used to train the network. During training process, the network weights between layers are improved until the error between predicted and experimental values is reduced to a defined number. With the aforesaid conditions, learning process occurs. Trained ANN can be utilized for output prediction of a new unknown pattern [3]. Thin layer drying properties of high moisture garlic sheets under semi fluidized and fluidized bed conditions with high initial moisture content (about 154.26% d.b.) were studied. Air temperatures of 50, 60, 70 and 80°C were applied to garlic samples. An artificial neural networks (ANN) model has been developed for determination the prediction of drying behaviors, such as MR and DR, of garlic in the fluidized bed drying process. The back-propagation learning algorithm with variant which is Levenberg–Marquardt (LM) and Fermi transfer function has been used in the network. In addition, the statistical validity of the developed model has been determined by using the coefficient of determination (R^2) and the root means square error (RMSE). R^2 and RMSE have been determined for MR and DR, as 0.99, 0.0285, and 0.993, 0.0732, respectively.

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**IDENTIFICATION OF CONSERVED DOMAINS FOR CODEINE O-
DEMETHYLASE (CODM) IN *PAPAVER SOMNIFERUM* L.**

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The opium poppy (*Papaver somniferum* L.) is one of the oldest cultivated medicinal plants. In the pathway has been reported to generate morphine in this species, CODM has a crucial role as the gene coding the enzyme responsible for demethylation of codeine to morphine. This study was conducted to identify conserved domains in the CODM enzyme. The sequence of CODM gene (AC: GQ500141) has been downloaded from NCBI database and *via* Conserved Domain Database (CDD) the conserved domains has been recognized. The results showed CODM conserved domain includes: 2OG-Fe (II) oxygenase superfamily, PLN02216-protein SRG1, and non-haem dioxygenase in morphine synthesis N-terminal which is the highly conserved N-terminal region of proteins with 2-oxoglutarate/Fe(II).



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**THE EFFECT OF DIFFERENT IRRIGATION INTERVALS ON
GROWTH PARAMETERS AND ESSENTIAL OIL OF
SALVIA MACROSIPHON BOISS.**

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Drought stress has destructive effect on majority of crops [1], however in medicinal plants it is conducive to increase secondary metabolite as desired effect [2]. In order to, investigate the effect of different irrigation intervals on growth parameters and essential oil of *Salvia macrosiphon* an experiment was conducted in Sari agricultural sciences and natural resources university in 2011. The experimental design was a randomized complete block with three replications. In this experiment plants irrigation intervals were 4, 6, 8 and 10 days. The obtained results showed that irrigation intervals had significant effects on all studied characteristics. Limitation of the water supply significantly reduced vegetative growth, in contrary cause increase essential oil. Main comparison indicated that the lowest plant height, shoot fresh and dry weight, root fresh and dry weight, root/shoot dry weight obtained at 10 days irrigation intervals. Essential oil content increased from 0.06% to 0.22% by increment irrigation intervals of 4 to 10 days. In conclusion, although is desirable increase essential oil affected drought stress, however reduce vegetative yield is undesirable, so detection appropriate irrigation intervals for achievement to sufficient yield in each plant is necessary. According to these results are desirable 8 day's irrigation intervals for cultivation of *Salvia macrosiphon* in these conditions.

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INVESTIGATION CHANGES IN CHLOROPHYLL, CAROTENOID AND PROLINE CONTENTS IN RESPONSE TO DIFFERENT IRRIGATION INTERVALS IN *SALVIA MACROSIPHON* BOISS.

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Drought stress with effect on metabolism and mechanisms into cells has destructive effect on growth and yield of plants. In contrast, some of the plants tolerance to stress by changes in secondary metabolite and special combination into itself cells. The experiment was carried out to study the effect of different irrigation intervals on proline, chlorophyll and carotenoid contents in *Salvia macrosiphon* Boiss. in Sari agricultural sciences and natural resources university in 2011. The experimental design was randomized complete block with three replications. Treatments include different irrigation intervals (4, 6, 8, 10 days) that performed 60 days later than cultivation. Measurement of chlorophyll and carotenoid contents according to the method of Porra et al., [1] and assessments of proline content based on the method of Bates et al., [2] were performed 20 and 65 days after applying the treatments, respectively. The obtained results showed that effect of irrigation intervals on chlorophyll a & b not significant, although total chlorophyll and carotenoid significantly reduced ($p < 0.01$). The lowest chlorophyll and carotenoid contents were obtained at 10 days irrigation interval. However, in other treatments have not significantly different. Proline content was increased by increment of irrigation intervals so that the most amounts of them were obtained at 10 days interval.

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A STUDY OF *PUNICA GRANATUM L.* POLLEN GRAINS TOTAL FLAVONOID EXTRACT ON IMMUNE SYSTEM RESPONSES

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Pollen is a bee -product known for its medical properties from ancient times. In our days is increasingly used as health food supplement and especially as a tonic primarily with appeal to the elderly to ameliorate the effects of ageing. Pomegranate (*Punica granatum L.*) is a deciduous shrub and native to Iran having ancient culture in this country and Iran is one of the biggest producers of pomegranate in the world. This fruit is used in traditional medicine because of its antibacterial, anti-inflammatory, and alleviative characteristics. Extracts of different parts of pomegranate fruit is rich in phenolic compounds and its rind extract and seed oil have vigorous antioxidant activity. It has been reported to possess immunomodulatory activity. Immune responses of different doses of *P. granatum L.* pollen grains total flavonoid extract was evaluated in Balb/C mice by Delayed type hypersensitivity (DTH) test and lymphocyte proliferation assay by method of MTT ((3-(4, 5-dimethyl tetrazolyl-2) 2, 5 diphenyl) tetrazolium bromide). Fifty Animals were classified in 10 groups and treated with eight doses (1, 5, 10, 20, 30, 50, 70 and 100 mg/Kg) of total flavonoid extract. DTH response significantly ($P < 0.05$) increased at doses of more than 20 mg/Kg. The highest DTH response was found at the 50 and 70 mg/Kg doses of extract. A significant increase ($P < 0.05$) in lymphocyte immune response was found at doses of 1, 5, 50, 70 and 100 mg/Kg but the best response was found at the 50 and 70 mg/Kg doses of extract. The results obtained in this study indicate that total flavonoid extract of *P. granatum L.* pollen grains have significant immunomodulatory activity that depends on specific dose-response.

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**THE EFFECTS OF SALICYL HYDROXAMIC ACID ON
GERMINATION INDICES AND BIOCHEMISTRY
HYPERICUM PERFORATUM L. SEED**

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In this study the effect of different levels of the hormone Salicylhydroxamic acid (SHAM) to improve germination and biochemical properties of St. Johns wort (*Hypericum perforatum* L.) was evaluated. Planning of the experiment in 1391 was conducted in the Laboratory of the Agricultural Research Station of Saveh. The experiment with factorial, completely in a randomized design with 3 replication and a factor included different levels of hormone Salicylhydroxamic acid in 4 levels: 0 (control), 50, 75, 100 ppm was used. The results showed that the use of hormone Salicylhydroxamic acid, germination percentage, shoot length, root length, weigh of droughty and fresh plant was significantly increased and catalase activity decreased. Considering the impact of germination in successful establishment of final plants treatments with using timmars for better germination in discussion domestication of medicinal plants to prevent from destruction of natural areas and prepare pharmaceutical raw materials required can be quite effective. Hence the low and unpredictable germination of St. Johns wort (*Hypericum perforatum* L.) using timars like plants hormones can successfully germination and thus increasing good results in the final operation.

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**THE EFFECT OF SOAKING DURATION ON SEED DORMANCY
BREAKING AND SEEDLING GROWTH OF
KELUSSIA ODORATISSIMA MOZAFF.**

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The effects of different soaking times on germination and seedling growth of *K. odoratissima* Mozaff. were investigated, which is one of Iranian endemic plants that belongs to Apiaceae. The dormancy characteristic and optimum conditions for seed germination of this species have not been explained so far. For this reason, there has been an interest in examining all factors that affect its seed germination and seedling establishment. In this experiment, the treatments consisted of four soaking durations (12, 24, 48 and 72 h) and control. Germination tests were performed in closed Petri dishes at 4°C in a refrigerator for 10 weeks and then these were transferred to growth chamber. The experiment was conducted based on a CRD with 3 replications, and each replication 25 seeds. According to results, soaking has significant effect on the seed germination percentage and radicle length in 48 and 72 h treatments, while did not affected shoot length. Our Results indicate that perhaps germination inhibitors of soluble in water are percent in seeds that can be removed by soaking.

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**POT PLANTING AND MYCORRHIZA INOCULATION USEFUL
METHODS FOR ESTABLISHING *ZIZIPHORA CLINOPODOIDES* IN
RANGELANDS**

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Several environmental conditions such as climatic stresses and low soil fertility limit the establishment of medicinal plant under their natural conditions. Hence in this research, we tested capability of pot planting and mycorrhiza inoculations as new methods for seedling establishment and growth of a medicinal plant, *Ziziphora clinopodoides*, within its natural habitat, Baharkish, Quchan, Northeast Iran. Seeds were sown in small trays under glasshouse conditions for 45 days, after which, seedlings were inoculated with two mycorrhiza species, *Glomus mosseae* and *Glomus intraradices*. After one month growth, the inoculated seedlings were transplanted into the field. A complete randomized Block design was used. Seedling establishment was assessed twice, at early and late growth season. Mycorrhiza infection rate with *G. mosseae* was 98.67% and with *G. intraradices* was 88%. There was no significant effect of inoculation on seedling establishment at early season, but at the end of growth there was a negative effect by *G. intraradices* but a positive effect by *G. mosseae*. Symbiosis with *G. mosseae* increased dry matter of leaf, stem, total dry matter and height of the plants while with *G. intraradices* had reduced these factors or the effects were non-significant. In conclusion (1) pot planting can be an efficient method for establishing *Z. clinopodpides* under natural habitats; (2) *G. mosseae* can be a more beneficial symbiant for establishing *Z. clinopodpides* in Baharkish rangelands.



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**EFFECTS OF MYCORRHIZA SYMBIOSIS ON INITIAL
ESTABLISHMENT AND MORPHOLOGICAL TRAITS OF *THYMUS
VULGARIS* UNDER FIELD CONDITIONS**

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While producing medicinal plants is more economic in their natural habitat than in farms, their establishment problems and slow growth rate are the main constraints under the field conditions. This study was aimed to investigate the possibility for seedling transplantation of *Thymus vulgaris* into the natural field conditions, also to test effect of mycorrhiza inoculation on establishment of this species in *Bahar Kish rangeland, Quchan*. Seeds were planted in glasshouse in small trays for 45 days, after which, seedlings were inoculated with two mycorrhiza species, *Glomus mosseae* and *Glomus intraradices*. After one month growth, the inoculated seedlings were transplanted into the field. A complete randomized Block design was used. Seedling establishment was assessed twice, at early and late growth season. Mycorrhiza infection rate with *G. mosseae* was 92% and with *G. intraradices* was 68%. There was no significant effect of inoculation on seedling establishment at early season, but at the end of growth there was a negative effect by *G. intraradices* but a positive effect by *G. mosseae*. Symbiosis with *G. mosseae* increased dry matter of leaf, stem, total dry matter and height of the plants while with *G. intraradices* had reduced these factors or the effects were non significant. In conclusion (1) pot planting can be an efficient method for establishing *T. vulgaris* under natural habitats, (2) *G. mosseae* can be a beneficial symbiant for establishment of *T. vulgaris* in Baharkish rangelands.



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INVESTIGATION OF ESSENTIAL OIL PROPERTIES OF DIFFERENT
VARIETIES OF LEMON (*CITRUSLIMON*) PEEL EXTRACTED BY
HYDRODISTILLATION

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Nowadays, essential oils are used as flavoring materials and in the preparation of perfumes and pharmaceutical products. They are called “essential oils” to be distinguished from “fatty oils”. The main methods to obtain essential oils from the plant materials are hydrodistillation (HD), steam distillation, steam and water distillation, maceration, empyreumatic (or destructive) distillation, and expression. Among these methods, HD has been the most common approach to extract the essential oils from the medicinal herbs/plants [1, 2].

In this research, extraction of essential oil from dry *CitrusLimon* (Lisbon and Eureka varieties) peel was performed by hydrodistillation method and extraction yield, extraction time, chemical composition of essential oils, physical constants, energy consumption, and quantities of released carbon dioxides in the atmosphere were investigated. Essential oil yield of Lisbon and Eureka varieties were 1.22±0.14 and 1.18±0.14% (w/w), respectively. There were no significant differences among physical constants (refractive index, color, and specific gravity) of extracted essential oils from Lisbon and Eureka varieties of lemon peel. Also, there were no significant differences among extraction energy consumption of both Lisbon and Eureka varieties (0.67 kWh). Using GC/MS apparatus, components of extracted essential oils were identified. The major component of extracted essential oils from Lisbon and Eureka varieties was limonene (66.24±4.69 and 59.40±4.20%, respectively). Also, there were no significant differences between quantity and quality of major components of extracted essential oils from two *C.Limon* varieties.

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A STUDY ON ANTIMICROBIAL PROPERTIES OF *ROSA FOETIDA*
AGAINST VARIOUS PATHOGENS

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Antimicrobial activity of *Rosa foetida* petal and fruit extracts (Rosaceae) against various human pathogens including 4 bacteria and 1 yeast were tested. Methods: The assessed pathogens were *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 25923, *Pseudomonas aeruginosa* PA0 1-D, *Salmonella enteritidis* and *Candida albicans* ATCC10231. Methanol extract of flower and fruit were obtained via maceration method (48 h at dark). Antibacterial and antifungal assays were performed by broth micro-dilution method as recommended by CLSI (Clinical laboratory Standard institute) and minimum inhibitory concentrations (MICs) were determined [1, 2]. Results: The results revealed that petal extract had better antibacterial activity against *Staphylococcus aureus* (MIC: 1mg/ml) *Escherichia coli* (MIC: 2mg/ml) *Salmonella enteritidis* 25922 (MIC: 4mg/ml), but no significant differences were found against *Pseudomonas aeruginosa* PA0 1-D between fruit and petal extract. In addition, fruit extract had better response against yeast (2mg/ml) in comparison with petal extract (4µg/ml). Conclusion: the current study shows that the *R. foetida* petals extract and fruit extract maybe considered as good sources for the antibacterial and antifungal activity respectively.

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SCREENING THE MEDICINAL POTENTIAL OF SOME WEEDS BY
HPTLC METHOD

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The medicinal value of medicine plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive compounds are including Phenolic compounds, glycosides, essential oils, and alkaloids. In this study HPTLC analysis was conducted to survey medicinal potential i.e. coumarins, terpenoids, phenolic compounds and gallic acid in *Cyperus difformis* and *Paspalum paspaloides* from various parts viz. root, stem and leaves in anchrom institute in Mumbai- India at 2009. Quantitative estimation of phenolic compounds showed that the root of *Cyperus difformis* (eight) and root of *Paspalum paspaloides* (two) had highest and lowest structures as compared with other parts of them. In case of coumarins, leave of *Paspalum paspaloides* was containing maximum substances (eleven) over other parts of studied plants. Both leaves of studied plants were rich in terpenoids (five numbers) while root of *Paspalum paspaloides* was weak aspect mentioned constitute in comparison other selected parts. The structure of the gallic acid was not present in any treatment except root of *Cyperus difformis*. It is concluded that studied plants have some structures of bioactive compounds which might be exploited as traditional healers.

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**INVESTIGATION ON CHANGES OF PROTEIN PATTERN IN
EMBRYONIC AND NON-EMBRYONIC CALLUS, MATURED EMBRYO
AND PLANTLET OF *RUMEX TUBEROSUS* L. SUBSP. *HORIZONTALIS***

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The genus of *Rumex*, which belongs to polygonaceae family, comprises about 100 species throughout the world. This genus has 23 annual and perennial species in Iran. Somatic embryos from different explants of *R. tuberosus* were induced on MS medium supplemented with several combination of 2, 4-D and Kinetin, 1mg/l charcoal and 6%(w/v) sucrose. Somatic embryos germinated and developed in to plantlet after transferring to MS medium PGRs free or with 1 mg/l ABA. In order to studying embryo development process, changes in proteins Pattern during somatic embryogenesis were studied by spectrophotometric and SDS-PAGE methods. Result showed that in embryonic callus in comparison with non-embryonic callus, the synthesis of proteins increased and it got optimum level in matured embryo. In addition, by formation to plant let the kinds of proteins were changed also. The presence of 14, 21, 105 KD proteins in non embryonic callus and 63, 91 and 131 KD proteins in embryonic callus and 38 ,52 ,68 and 83 KD proteins in the heart-shaped embryos and 29, 57, 97 and 116 KD proteins in plantlet were distinguished. Furthermore some proteins like 77 and 18 KD was the same in each of them. According to this observation the synthesis and deposition of this storage during somatic and zygotic embryogenesis are usually regulated through ABA and water-stress induced gene expression. In addition, polyphenol oxidase and peroxidase activities were studied spectrophotometrically during somatic embryo development. It seems that, the activities of these enzymes increased during somatic embryo development, that maybe related to ABA treatment or osmotic stress required for embryo maturation. According to this observation, synthesis ability of peroxidase family enzymes was simultaneous with raising activation in polyphenol oxidase family enzymes during embryo maturation and development. Result showed that, peroxidase enzyme by lignification and differentiation in cell-wall and prevention of cell-growth make embryonic plant-cell collection.

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**UV IRRADIATION EFFECTS ON SEED GERMINATION
AND GROWTH, PROTEIN CONTENT, PEROXIDASE AND
PROTEASE ACTIVITY IN PORTULACA GRANDIFLORA AND
PORTULACA OLERACEA**

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Ultraviolet radiation is energetically capable of disrupting proteins. Ultraviolet radiations are divided into three bands included UV-A (320-390 nm), UV-B (280-320 nm) and UV-C (254-280 nm). Several studies have indicated that enhanced UV-B radiation can deleteriously affect physiological processes and overall growth in some plants species. *Portulaca grandiflora* and *Portulaca Oleracea* seeds irradiated with 220 to 400 nm UV rays were grown in incubator for 8 days at 25±°C. Germination, growth (seedling fresh weight, root shoot length and their ratio), lipid peroxidation, protease and peroxidase activity were measured in leaves. Results showed that percent germination of the seeds and the rates of growth of sprouts were inversely related to the irradiation doses. In *Portulaca Oleracea*, peroxidase and protease activities (two folds) and MDA contents were higher as compared to *Portulaca grandiflora* while vice versa for protein contents, revealing inherent differences between two types. Data for protein contents, peroxidase and protease activities therefore suggested that irradiation dose should not under 300 nm UV in *Portulaca Oleracea* and also 300 nm UV in *Portulaca grandiflora*. In *Portulaca Oleracea* 320 to 400 nm UV irradiation dose non-significantly affected the protein contents and peroxidase activity and uppered MDA contents and protease activity. In *Portulaca grandiflora* 300 nm UV irradiation dose increased the peroxidase activity, uppered the MDA contents and affect the protein content and protease activity. It was concluded that protein contents, protease, peroxidase and lipid peroxidation may be used in early assessment of effectiveness and superiority of radiation dose to induce mutations.

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**COMPARATIVE EFFECTS OF MENTHOL AND ULTRAVIOLET
RADIATION ON PERCENTAGE OF THYME AND ALTHEA SEED
GERMINATION**

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This research has conducted to examine effects of menthol as a parameter of allelopathy and ultraviolet radiation as harmful effects of Ozone layer destruction was performed on thyme and althea seeds germination. This was done in two separate experiments: A; menthol treatment test by 5 level (25% -50% -75% and 100%) and ultraviolet radiation by 4 levels (UVA-UV B -UVC) were tested with control based on randomized complete block design in 3 replications on Mylajrd University Laboratory. The results including: growth periods-water absorb and seed germination per days, the highest percentage of seed germination obtained on percentage of control varieties with 81% water absorb and seed germination, and when menthol increased on hydroponic solution, seed germination decreased from 71% to 51% of 25% to 100% menthol and this result was significant. Results were observed not significant between all control seeds and 25% of menthol treatment, but results show significant between this two treatment and 50%, 75% and 100% menthol treatment at 1% level according to Duncan test. The review results of ultraviolet treatment shows that control treatment was the highest performance with 81% seed germination and not significantly with UVA. The results of seed germination rate plan are take the ultraviolet b and c decreased seed germination of 53% to 12% and that significant at 1% level were based on Duncan test.

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**INCREASE OF PHENOLIC COMPOUNDS OF YARROW TREATED
BY SILVER NANOPARTICLES**

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Yarrow plant (*Achillea millefolium* L. Asteraceae), is a perennial herb highly recognized in traditional medicine for its anti-inflammatory properties. It has long been used internally as herbal tea and externally in lotions and herbal medications to treat respiratory infections, fever, rheumatic pains, skin inflammations, hepato-biliary disorder, and gastrointestinal complaints. The major constituents of the plant include phenolic compounds such as azulene, cineol, borneol, pinenes and camphor. In the present research, yarrow plants in their flowering stage were treated with 20, and 60 ppm of silver nanoparticles in an aerated Hoagland solution for 48 h. Total soluble phenolics content as well as the concentrations of anthocyanin and flavonoids was assayed. The results showed that anthocyanin and flavonoid contents of the plant increased by 20 ppm of silver nanoparticles, while total soluble phenolics increased in those plants which were treated with 60 ppm of nanoparticles. The results suggest that increase of these compounds is a defensive strategy of the plant against silver nanoparticles. Regard to the fact that antioxidant activity of many phenolic compounds is even higher than vitamins C, E and β -carotenes, short period treatment of yarrow plants with silver nanoparticles can be suggested in order to increase medicinal properties of the plant.



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FLORAL DEVELOPMENT, STIGMA RECEPTIVITY AND POLLEN VIABILITY IN *SATUREJA RECHINGERY* JAMZAD

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The present article studies the Floral development, Levels of stigma receptivity and pollen viability as well as the various tests of its assessment. Floral development studies were conducted at 7 stage (0 stage (even), visibility of part of the head, half the size of flower, three-quarter size of the flower, anthesis stage as well as wilted stage) as a precursor to breeding efforts. During each stage was (0, 3-4 days, 2 days, 1 day, 1 day, 1 day and 6 days) respectively. The total development period is 13 to 14 days. Also in various stages of development, different parts of the flower are measured. Levels of stigma receptivity and pollen viability were evaluated at different stages during flower development. We tested pollen viability and stigma receptivity using three vital dyes, one peroxidase reaction and MTT test (for stigma receptivity), together with three other established methods (MTT, TCC and X-Gal), to determine their potential to differentiate fresh pollen from pollen of flower at different stages and the MTT stain was determined as the most effective method compared with two other methods. In this plant were found to be receptive to pollination over a wide range of floral developmental stages, including stages anthesis until brown tip of stigma. Maximum receptivity is three days after flower opening. Pollen was found to reduce viable throughout the open flower period. The highest and lowest pollen viability obtained at early flower opening (95%) as well as fifth day after flower opening (43.7%) respectively. This experiment was done in a completely randomized design with 5 repeats of treatments.



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EVOLUTION OF RELATIONSHIP BETWEEN *SATUREJA KHUZISTANICA* AND *S. RECHINGERI* JAMZAD USING WITH MORPHOLOGICAL MARKERS

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Satureja khuzistanica and *Satureja rechingeri* Jamzad are two of the endemic species of genus *Satureja* L. which are dispersed in tropical and subtropical regions South West of Iran. These species are superior of metabolites (rich of carvacrol), growth, resistance to lake of water conditions and poor soils. Therefore, they have been considered for future breeding programs and medicinal purposes. To evaluate the relationship between in these species with morphological markers in 36 genotypes of seven populations of *Satureja rechingeri* and *Satureja khuzistanica* were investigate. Morphological characters are useful for estimating phylogenetic relationships. This experiment was done in a completely randomized design over the past two years. The results of the analysis of variance showed that some of traits such as leaf width, inflorescence length, bract length, number of lateral branches, State of calyx hairs, State of leaf hairs showed considerable variation among genotypes of two species. The populations of *Satureja khuzistanica* and *rechingeri* were separated into two groups by cluster analysis using Ward method.



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**ANTIBACTERIAL ACTIVITY AND CHEMICAL COMPOSITION OF
AJOWAN (*TRACHYSPERMUM AMMI*) ESSENTIAL OIL AGAINST
SOME PATHOGENS WITH MACRO DILUTION METHOD**

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In order to assess the influence of antibacterial effects of ajowan (*Trachyspermum ammi*) against some pathogens an experiment was done at biotechnology laboratory of Shahid Chamran Ahvaz in 2011. Gas chromatography (GC) and gas chromatography mass spectrometry (GC-MS) were employed to determine the chemical composition of essential oil obtained from dry fruits of Ajowan (*Trachyspermum ammi*) and macro dilution with minimum Inhibitory Concentration (MIC) and minimum Bacterial concentration (MBC) were used for determination of antibacterial effects of ajowan against *Staphylococcus aureus*, *Escherichia coli* O157H7 and *Bacillus cereus*. The result showed that Thymol (70.58%), gamma-terpinene (13.32%) and beta-cymene (12.8%) were found to be the major constituents of the oil. The oil exhibited significant antibacterial activities against all the examined bacteria. The MBC in the 50 gr dry matter Ajowan for *Staphylococcus aureus*, *Escherichia coli* O157H7 and *Bacillus cereus* were 1.8, 1.25 and 1.2 (mg/ml) respectively. MIC for *Staphylococcus aureus*, *Escherichia coli* O157H7 and *Bacillus cereus* were 1.16, 1.51, 1.4 (mg/ml) respectively. The *Escherichia coli* bacteria were the resistant than others. Finally, the results of this study showed that the oil of Ajowan is rich in monoterpenes and it may be used as a natural anti-bacterial agent in drug and food industries.



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ANTIMICROBIAL ACTIVITY OF LEAVES OILS (*MARROBIUM VULGARE*) AGAINST *STAPHYLOCOCCUS AUREUS* RESISTANT ANTIBIOTIC

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Staphylococcus aureus is one of the important agent pathogens in hospital infections and out of the hospital. This study aimed to evaluate the antimicrobial effects of oils against clinical strains resistant *Staphylococcus aureus*. was performed *Marrobium vulgare* oil using of clevenger. The emergence of *S. aureus* strains resistant have been to multiple antibiotics to treat infections cause many problems by these microorganisms. So many efforts have been used to find new compounds as a replacement for antibiotics. samples of *Staphylococcus aureus* isolated from nasal regions hospital staff and finally MIC (minimum inhibitory concentration) and MBC (minimum bactericidal concentration) *Marrobium vulgare* oil was investigated by Broth dilution Microd technique on *Staphylococcus aureus*. The results showed that *Marrobium vulgare* oil white concentration 10 mg, 5 mg, 2/5mg, 1/25 mg, 0/62 mg and 0/3 mg were effects differentially on *S. aureus*. Approximate *Marrobium vulgare* oil in the concentrations of 0/3, 0/62, 5/25, 2/1 and 5 mg in order to 5/ 88, 11/76, 41/17, 11/76, 17/64 percent as MIC is considered, and in the concentration of 0/3, 0/62, 1/25, 2/5, 5 and 10 mg, respectively, 11/76, 17/64, 29/41, 70/58, 82/35 and 100% as the MBC is considered.

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**ANTIMICROBIAL ACTIVITY OF ETHANOL EXTRACT OF
EUCALYPTUS (*EUCALYPTUS GLOBULES*) AND
(*SATUREJA HORTENSIS*) AGAINST OF *STAPHYLOCOCCUS AUREUS*
DIEFFICALT ANTIBIOTIC-RESISTANT**

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Staphylococcus aureus is a human major pathogen whome People carriers of the bacteria are as an important source to cause illness in healthy people. So many efforts have been to find new compounds used as a replacement for antibiotics. This study aimed to investigate the effect of alcoholic extract of eucalyptus bacterial strains against resistant *Staphylococcus aureus* the study. Savory and eucalyptus herbs extracts were measured with using of the Rotary. 17 samples *Staphylococcus aureus* was isolated from of the nose and throat area and the MIC (minimum inhibitory concentration) and MBC (minimum bactericidal concentration), and fainely eucalyptus plants by the method Plate Mykrotytr on *Staphylococcus aureus* was investigated. Results showed that the extract 1/25mg-2/5mg-5mg-10mg Ethanol of eucalyptus with concentration 0/3 on *Staphylococcus aureus* had a different effect. The 0/62 mg and 5 mg in order to 2/5 mg and mg approxemility eucalyptus extract in t concentrations entendedwihle MIC the value 11/76 and 88/23 percent as 10 mg and 5 mg 11/7 while approximately 6 and 100 percent in the concentration intended. In the MBC of eucalyptus ethanol extract in the compared with the same concentration of ethanol extract showed the following results. is in order to the value 2/5 mg and 5 mg .while plant in the concentration intended. while approximately MIC 76/47 and 23/52 percent and MBC approximately 76/47 and 100 percent in the plant extract intended.



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**THE EFFECT OF GARLIC (*ALLIUM SATIVUM*) EXTRACT ON
IMMUNE RESPONSE AND GROWTH OF MARKHOZ NEWBORN
KIDS**

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Garlic (*Allium sativum*) had several properties such as anti oxidant, anti microbial and appetite stimulating [1]. The aim of this study was evaluation of Garlic Extract (GE) effect on response to cell-mediated immune and growth performance improvement in lactating period and also prohibition of death in Markhoze newborn kids. In this study 24 newborn kids were randomly assigned into 4 groups (control diet only with milk, control diet+ 104mg GE/kg BW, control diet+ 208 mg GE/kg BW and control diet+ 416 mg GE/kg BW). After uniforming and selection of treatments, test period began from the first week after birth and last for 6 weeks (d 42). In the end of each week, samples were weighted and amount of GE was increased based on it. In order to determine the cell-mediated immune, Phytohemagglutinin (PHA) injection was performance in 0,8,16 and 24 h in days 21 and 42 and double skin thickness was measured at that times. In addition, taking blood samples of testing kids were done in 2 times: the end of examination and d20 after it. Results from data analyzing showed that amount of Garlic extract was significant in increase of weight (g/kg) in third week ($P<0.05$). also double skin thickness after injection of PHA was significant in 104mg GE/kg BW in d 42 but not-significant in d 21. Amount of blood parameters were for lymphocyte, neutrophils segmented, haematocrit value (PCV) not significantly affected by treatments ($P>0.05$). Red Blood Cells (RBC) numbers was significant in second treatments including 104mg RE/kg BW ($P<0.05$) but White Blood Cells (WBC) were not significant in 416 mg GE/kg BW which received the most amount of Garlic extract.

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**EVALUTION ANTIMICROBIAL ACTIVITY HYDROALCOHOLIC THYME
EXTRACT (*ZATARIA MULTIFLORA* BOISS) AGAINST ANTIBIOTIC-
RESISTANT STRAINS OF *E. COLI***

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Due to the increasing resistance of common pathogenic bacteria to antibiotics and new researchers seeking antimicrobial agents as alternative medicines are. Thyme is a family of Nnyayan and has properties antimicrobial activity. This study has been done aimed to investigate the anti-bacterial thyme extracts against clinical isolates of antibiotic-resistant *E. coli*. was extracted with using of Rotary. 19 cases of *E. coli* of the patients Urinary Tract Infection in a hospital in Zahedan city were isolated and their antibiotic resistance was determined in the faintly MCI (Minimum inhibitory concentrations) and MBC (Minimum Attraction concentrations) Thyme extract in the dilution technique has been well studied on *Escherichia coli*. The results showed that the extracts effect with of low concentration is low. Thyme extract have at a concentration of 10 mg mL highest inhibitory effect on the growth of *E.coli* at the concentration of 20 mg per mL is the most lethal effect.

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COMPARATIVE POLYPHENOLIC AND TOTAL PHENOLIC
CONTENTS OF *TEUCRIUM POLIUM* IN DIFFERENT GROWTH
STAGES

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Teucrium is a genus of perennial plants which belongs to the family of Lamiaceae (Labiata) and is represented by more than 340 species wide spread all around the world and has about 12 species in Iran. *Teucrium* genus, especially *T. polium* shows high contents of secondary metabolites. In order to assess the effects of different harvesting times on phenolic contents of medicinal plant *Teucrium polium* experiment was carried out in the design randomized complete in three replicates. The total phenol content of methanolic extract *T. polium* from the aerial parts in vegetative, flowering and fruit stages was measured based on Folin-Ciocalteu reagent and phenolic compounds by HPLC method. Results showed that the harvest time has a significant effect on phenolic contents of the herb and the highest total phenolic was determined in the fruit stage. In the polyphenolic compounds, gallic acid in fruit stage and caffeic acid in vegetative stage have had the most result and chlorogenic acid has only been detected in vegetative stage.

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**THE EFFECT OF VERMICOMPOST ON MORPHOLOGY AND YIELD
OF BALM (*MELISSA OFFICINALIS*)**

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To study the effect of vermicompost on morphology and yield of balm (*Melissa officinalis*), this experiment was conducted in 2012 in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. The experiment was conducted in the form of a randomized complete block design with three replications. Treatments included different application rates of vermicompost (0, 5 and 10 t/ha). Results indicated that vermicompost application significantly affected plant yield and all the studied morphological traits including plant height, the number of lateral stems, inflorescence length, the number of leaves, internodes length, canopy circle, canopy diameter, stem diameter, the number of tillers, leaf width, leaf length, flowering shoot yield, leaf yield, stem yield and leaf area ($P \leq 0.01$). Mean comparison indicated that the highest plant height (25.5 cm), inflorescence length (16.52 cm), internodes length (2.28 cm), canopy circle (130.11 cm), canopy diameter (45.5 cm), stem diameter (0.41 cm), leaf length (4.49 cm), leaf width (3.5 cm), flowering shoot yield (1089.24 kg/ha), leaf yield (899.01 kg/ha) and stem yield (225.57 kg/ha) were achieved when 10 t/ha vermicompost was applied. From the results of this experiment it can be concluded that vermicompost application can increase the morphological features and yield in balm.



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**IMPROVING BALM (*MELISSA OFFICINALIS*) GROWTH AND
YIELD BY BIOFERTILIZERS APPLICATION**

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In order to assess the effect of biofertilizers on balm (*Melissa officinalis*), this experiment was conducted in 2012 in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. The experiment was conducted in the form of a randomized complete block design with three replications. Treatments included inoculation with (1) *Glomus intraradices* + *Glomus mosseae*, (2) *Piriformospora indica*, (3) *Glomus intraradices* + *Glomus mosseae* + *Piriformospora indica* and (4) a non-inoculated control. Analysis of variance indicated the significant effect of treatments on yield and morphological traits such as plant height, number of lateral stems, inflorescence length, the number of leaves, internodes length, canopy circle, canopy diameter, the number of tillers, leaf width, leaf length, shoot yield, leaf yield, stem yield and leaf area at $P \leq 0.01$. Mean comparison indicated that the highest plant height (29.28 cm), inflorescence length (16.74 cm), internode length (2.29 cm), canopy circle (143.02 cm), canopy diameter (49.8 cm), leaf length (4.7 cm), leaf width (3.55 cm), shoot yield (1143.07 kg/ha), leaf yield (902.14 kg/ha) and stem yield (213.66 kg/ha) were achieved in the triple inoculation of *Glomus intraradices* + *Glomus mosseae* + *Piriformospora indica*. Results of this experiment generally imply that the mycorrhizal inoculation along with *Piriformospora indica* inoculation significantly increases balm growth and yield.



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DETERMINATION OF NUTRITIVE VALUE OF *RHEUM-L* USING IN VITRO GAS PRODUCTION TECHNIQUE

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The aim of this experiment was to determine the chemical composition and nutritive value of *Rheum-L* using gas test production. In vitro gas production is a technique which used in nutritive animal laboratory that using of microorganisms in rumen fluid for gas production and evaluation of different feeds in diet livestock. Amount of *Rheum. L* plant sample was collected from mountain, dried at 60 °C for 48 h. The percentage of dry matter (DM) and chemical composition including crude protein (CP), Natural detergent fiber (NDF), acid detergent fiber (ADF), crude ash (Ash), organic matter (OM) and some of mineral matter (MM) in plant was determined by AOAC methods [1]. The fermentation kinetics of *Rheum-L* was determined using in vitro gas production (Menke) [2] technique after 144 h of incubation. Results showed that the CP content of *Rheum. L* was 21.96 percent. Also, the amount of DM, NDF, ADF, Ash and OM of *Rheum-L* was 92.62, 34.54, 32.82, 27.9 and 72.1 percent. Average net gas production during 144 hours, was 386.51 ml/g OM for *Rheum-L* plant. Amounts of the OMD and ME in *Rheum-L* were 67.72 and 11.14 MJ/kg DM, respectively. Moreover, amount of mineral matter including Calcium (Ca), Phosphor (P), Potassium (K), Sodium (Na), Iron (Fe), Zinc (Zn), Manganese (Mn) and Copper (Cu) were 9.8 (g/kg), 1.95 (g/kg), 16.88 (g/kg), 3.8 , (g/kg), 204.34 (mg/kg), 25.77 (mg/kg), 30.27 (mg/kg) and 54.66 (mg/kg), respectively. Also buffering capacity and PH were 28.75 and 3.2, respectively. These results showed that the nutritive value of *Rheum-L* is similar to some legumes (e.g., red clover and Barley malt sprouts) which maybe make using those as potent forage or parts of ingredient for ruminants. However, further research is needed to determine the effects on animal performance.

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**EFFECTIVENESS OF ROSE OIL SOFTGEL ON GASTRITIS: A CASE
SERIES STUDY**

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Gastritis is a common ailment of gastrointestinal tract worldwide. Gastritis could be asymptomatic; however, abdominal pain along with nausea, vomiting, indigestion, belching, bloating, loss of appetite, and loss of weight would occur in many cases. Its causes are divided into acute and chronic ones. Alcohol consumption and long use of NSAIDs are two major acute causes. Chronic causes are infection with bacteria, primarily *Helicobacter pylori*, chronic bile reflux, and stress; certain autoimmune disorders can cause gastritis as well. Treatment begins with OTC antacids. When antacids don't provide enough relief, H₂ blockers like ranitidine and even proton pump inhibitors (PPIs) like omeprazole are often prescribed. Bacterial cause is managed by bismuth preparations and antibiotics. Although these medications could manage the disease in most cases, there are some patients remaining untreated. In addition, side effects of these medications are considerable and even annoying. Antacids alter gastric pH and disturb digestion. H₂ blockers in long-term use increase the risk of cognitive decline. Headache, diarrhea, abdominal pain, and nausea are common adverse effects of PPIs specially omeprazole. Some of these adverse effects like dyspepsia, abdominal pain, and nausea are common between the disease and drugs which was supposed to treat the disease. Thus, finding new medications are preferable.

Rose oil (*Rawghan-e Gul*) is an Iranian traditional formulation prescribed in gastrointestinal diseases including gastritis. It is prepared by macerating rose petals in sesame oil under sunlight exposure for 25 days. The method of preparation and also the final product have been previously standardized by us according to phytochemical factors. Dosage form (1 gr softgel) was produced in Barij Essence Pharmaceutical Company. Effectiveness of rose oil softgel was evaluated by monitoring changes in symptoms of 5 patients affected with gastritis. These patients gave no medicines for this problem. The prescribed dose was 1 gr softgel t.i.d. for 3 weeks. The results showed that rose oil softgel could ameliorate nearly all symptoms of gastritis especially abdominal pain and belching. Therefore, it could be a new candidate in gastritis drug therapy. Due to another therapeutic effect of rose oil in Iranian traditional medicine, i.e. anti-headache effect, combination use of this drug with omeperazole could not only enhance the effectiveness, but also reduce omeprazole adverse effects. More clinical studies on larger population along with eliminating placebo effects are recommended.



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CALLUS INDUCTION FROM DIFFERENT EXPLANTS
***OCIMUM BASILICUM* WITH THE PLANT GROWTH REGULATORS**

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Ocimum sanctum, commonly known as “Holy Basil”, belongs to the family of Lamiaceae. The plant is held sacred by Hindus all over the world as it is an herb that is used for religious purposes, in addition to its great medicinal values. This study was to investigate the effect of plant growth regulators (NAA and BAP) on callus formation of different explants of. A factorial experiment in the form of randomized completely design with 12 treatments and 3 replications were carried out. The treatments consisted of different types of explants (hypocotil, cotyledon and root) and Murashig and Skoog (MS) media containing of (0.5, 1 mg/l) NAA and (0.1, 0.25 mg/l) BAP. The results showed that effect of explants, culture, media which supplemented with (0.5, 1 mg/l) NAA and (0.1, 0.25 mg/l) BAP and interaction of explant× media were significant ($p < 0.01$). The highest weight of callus was obtained in MS medium containing 1mg/l NAA + 0.1 BAP with using cotyledon as explant. The lowest weight of callus was produced in MS medium containing NAA (0.5 mg/l) + BAP (0.1 mg/l) with root as explant. The results indicated that there were significant changes in callus formation in the different plant tissues of Holy Basil and different concentrations of NAA or BAP on (MS) media.

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ANTIOXIDANT AND FREE RADICAL SCAVENGING ACTIVITY OF
ILEX SPINIGERA

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Ilex Spinigera (Aquifoliaceae) is a shrub that overall habitat in the forest of northern of Iran from Gilan to Golestan. This is a medicinal plant but is rarely used medicinally due to its toxicity, but is diuretic, relieves fevers, and has a laxative action. It contains saponins, the xanthine theobromine, and a yellow pigment, illexanthin. Reactive oxygen species (ROS) are a class of highly reactive molecules derived from the metabolism of oxygen. ROS, including superoxide radicals, hydroxyl radical and hydrogen peroxide molecules are often generated as by products of biological reactions or from exogenous factors. Evidence suggests that compounds especially from natural sources are capable of providing protection against free radicals. This has attracted a great deal of research interest in natural antioxidants [1]. In the present study was conducted to analysis antioxidant activity of various extracts of *Ilex Spinigera* leaves. Water, ethanol and methanol used as solvent. The content of total phenolics in the extract was determined according to a modified version of the procedure described by Singleton and Rossi [2]. The extracts exhibited total phenolic contents ranging from 0.0375 to 0.117 (mg GAE/ g dried matter). Total flavonoid content were measured with the aluminum chloride colorimetric method [3]. Total flavonoid content ranging from 0.01 to 0.03 (mg QUE/g dried matter). The ability of extracts to scavenge of DPPH radicals (IC₅₀) [4] was determined 145.49 µg/ml for ethanol, 102.22 µg/ml for methanol and 106.58 µg/ml for water. The antioxidant activity of the extracts was comparable to ascorbic acid. Therefore water in total phenol and methanol in total flavonoid measurements were the most effective solvents for extraction of *I. spinigera* leaves. The methanolic extract in DPPH assay provides to be the most effective solvent. The experimental evidence, therefore, suggests that because of the antioxidant activity of these extracts may offer excellent in the treatment of human diseases where oxidative stress plays a key role.

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COMPOSITION AND ANTIBACTERIAL POTENTIAL OF ESSENTIAL OIL FROM *THYMUS MIGRICUS* KLOKOV & DESJ.-SHOST

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Thymus species are well known as medicinal plants because of their biological and pharmacological properties. [1]. The genus Thymus L., known as “Avishan” in Persian, is a well-known aromatic perennial herb originated from Mediterranean region. Among 215 species of this genus grown in the world, 14 species are distributed in Iranian flora (Jalas, 1982; Stahl-Biskup & Saez, 2002). [2]. Hydrodistillation of the aerial parts of the plant yielded 0.53 v/w of oil. GC and GC/MS analysis of the plant essential oil resulted in the identification of eighteen compounds from the *Thymus migricus* Klokov & Desj.-Shost. Essential oil. Cis-Sabinene hydrate (29.7%), caryophyllene oxide (24.67%) and D-Verbenone (21.63%) were detected as the major components consisting 76% of the oil. Antimicrobial tests were carried out by the MIC agar dilution assay [3]. The plant oil inhibited moderately the growth of all tested bacteria.

Antimicrobial activities of *Thymus migricus* essential oil

Microorganism(PTCC ^a Certificate)	MIC ^b	MIC of ref. ^c
<i>Escherichia coli</i> (1533)	128	16
<i>Pseudomonas aeruginosa</i> (1310)	32	8
<i>Staphylococcus aureus</i> (1431)	64	16

^aPersian type culture collection (PTCC), Tehran, Iran. ^bMIC: Minimal inhibitory concentration(μg/ml).
^cAmpicillin and Tetracycline Fluconazole were used as references for Gram-positive and Gram-negative bacteria, respectively.

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**CHARACTERIZATION OF VOLATILE COMPONENTS OF LEAVES
AND FLOWERS OF SWEET ORANGE (*CITRUS SINENSIS* L.) USING
HEADSPACE/GC-MS**

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Citrus essential oils are the most widely used essential oils in the world. They are used as aroma flavor in many food products; including alcoholic and non-alcoholic beverages, candy, gelatins, in pharmaceutical industries they are employed as flavoring agents to mask unpleasant tastes of drugs. In this investigation, the aerial parts of *Citrus sinensis* were subjected headspace (HS) technique after drying, and volatile components were analyzed by gas chromatography-mass spectrometry (GC/MS). The numbers of volatile compound identified in the leaf and flower were 32, 31 respectively. The major constituents in leaf oil were found to be Sabinene(43.2%), Limonene(3.8%), Linalool (10.3%), (E)- β -Ocimene(9.3%), δ -3-Carene (8.6%), Myrcene(5%), β -Pinene(3.1%), α -Pinene(3.0%). In the flower oil the main components were Sabinene(31.5%), Limonene(10.3%), Linalool (28.9%), (E)- β -Ocimene (6.4%), δ -3-Carene(3.6%), Myrcene (4.8%), β -Pinene (1.6%), α -Pinene (1.5%).

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**VARIATION IN ESSENTIAL OIL CONTENT AND COMPOSITION
OF ASSAFOETIDA (*FERULA ASSAFOETIDA*) IN KERMAN PROVINCE**

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Ferula assafoetida is herbaceous, monoecious and perennial plant belonging to Umbelliferae family. It is one of the important medicinal plants that native to Iran and Afghanistan [1, 2]. The objective of this study was to evaluation of quantity and quality of resin essential oil of *Ferula assafoetida* in different regions of Kerman province, Iran. The resin of *Ferula assafoetida* plants were collected from nine rangelands in Kerman province. The essential oil of samples of *F. assafoetida* was isolated by hydrodistillation using a Clevenger-type apparatus. The oils were analyzed by using GC and GC/MS. Results showed essential oil content varied from 10.07% to 7.24% (v/w). Chemical profiles of samples showed variation in main and minor compounds of oils. The main of compounds were α -pinene (4.15-6.70%), (E)- β -ocimene (2.5-6.28%), n-propyl sec-butyl disulfide (0-5.01%), (E)-propenyl sec-butyl disulfide (37.30-53.99%) and (Z)-propenyl sec-butyl disulfide (12.10-23.10%).

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COMPARISON OF SOME VEGETATIVE CHARACTERISTICS AND
INVESTIGATING THE CHANGES OF ESSENTIAL OILS OF
T. KOTSCHYANUS IN WEST AZARBAIJAN

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T. kotschyanus is distributed in some areas of Iran Such as Urmia province. In order to to compare some Vegetative charecteristics and investigating the changes of essential oils of *T. kotschyanus* an experiment was conducted in research farm of Saatlou research station. For this experiment Seeds of *T. kotschyanus* were cultured in each year for two years. Vegetative charecteristics such as dry weight of shoot and ratio of dry weight to wet weight were compared, in addition changes of essential oils such as Thymol, Carvacrol, 1,8-cineol, p-cymene and γ -terpinene were investigated. Results of data were analyzed with variance analysis, correlation analysis and compare means. Variance analysis showed that effect of various stages of harvest on dry weight of shoot and ratio of dry weight to wet weight was significant. Also effect of various stages of harvest on essential oils and oils function just was significant in first year of experiment. We had positive correlation between dry weight of shoot and percent of thymol. Moreover, positive correlation was observed between ratio of dry weight to wet weight and percent of p-cymene. Overall, combined analysis showed that year of harvest and stages of harvest had been important role on both vegetative charecteristics and percents and functions of essential oils in *T. kotschyanus*.

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DIURETIC EFFECT OF EXTRACT OF *LIPPIA CITRIODORA*, *ECHIUM AMOENOM* AND *URTICA PILULIFERA* IN MALE RAT

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In Iranian Traditional Medicine, Various Medical plants have been recommended as diuretics. *Lippia citriodora*, *Echium amoenom*, and *Urtica pilulifera* are among remedies employed as diuretic. In this study diuretic effect of ethanol extract of the herbs in male rat (n=6) were assessed. Ethanol extract of *E. amoenom* in doses of 200, 400, and 800mg/kg, *L. citriodora* in doses of 50, 100, 150, and 450 mg/kg and *U. pilulifera* in doses of 200, 400 and 800 mg/kg was administered (P.O.) to Rats which were maintained individually in metabolic cages. Two other groups were treated (P.O.) with hydrochlorothiazide (HCTZ 30mg/kg) or normal saline (control). All doses were administered as 5mlit/kg to ensure equal volume of liquids received by all animals. Urine output, Na⁺, K⁺, Cl⁻, pH and specific gravity of urine were determined in 4 hours after treatment. Results indicated that the extract of *L. citriodora* could cause a significant increase in Na⁺ and Cl⁻ excretion in 150mg/kg ($p<0.05$) as compared with control. In this extract have not a significant effect on urinary output, pH, and Specific gravity and K⁺ excretion as compared with control.

The extract of *U. pilulifera* could cause a significant increase in Na⁺, Cl⁻ excretion and urinary output and decrease of specific gravity in 800 mg/kg ($p<0.05$) as compared with control. This extract in 400mg/kg could cause a significant increase in K⁺ and Cl⁻ as compared with control, too. The extract of *E. amoenom* only at 200 mg/kg could cause a significant increase in Na⁺ excretion as compared with control. Other doses have no effect on other factors. HCTZ (30mg/kg P.O.) treatment caused a significant increase on urinary output, Na⁺, K⁺ and Cl⁻ excretion and decrease of specific gravity ($P<0.05$) as compared with control. So in this study diuretic effect of *U. pilulifera* confirmed but the extract of *E. amoenom* and *L. citriodora* couldn't cause considerable diuresis, while they effect on urinary electrolytes composition, slightly.



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ESSENTIAL OILS COMPOSITION AND ANTIOXIDANT PROPERTIES
OF TWO *THYMUS* SPECIES

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The genus *Thymus* L., known as “Avishan” in Persian, is a well-known aromatic perennial herb. Originated from mediterranean region. Among 215 species of this genus grown in the world, 14 species are distributed in Iranian flora [1]. *Thymus* species are well known as medicinal plants because of their biological and pharmacological properties. In tradition almedicine, leaves and flowering parts of *Thymus* species are widely used as tonic and herbal tea, antiseptic, antitussive, and carminative as well as treating colds [2, 3]. The essential oils of two wild-growing *Thymus* species, during the flowering stage. Collected from (South & North) of Alborz (Taleghan- Asara). The essential oil isolated by hydrodistillation and then analyzed by gas chromatography/mass spectrometry (GC-MS) [4], also isolated oil was used for antioxidant activity. 22 components in essential oil of *T. kotschyanus* Boiss & Hohen and 21 compounds in *T. pubescens* Boiss & Kotschy ex Celak were identified. The major components of *T. kotschyanus* essential oil were and *T. pubescens* respectively carvacrol (1.46 – 6.54%), *p*-cymene (5.3– 2.35%), γ -terpinene (6.08 – 4.68%), linalool (0.21–7.07%), α -pinene (2.39 – 0.19%), and phenol (53.60 – 48.52%). Antioxidant activity was employed by one complementary test systems, namely, 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free-radical scavenging and assay of total phenolic and flavonoids. [5, 6] Antioxidant activity of *T. pubescens* methanol extract of both *T. pubescens*, *T. kotschyanus* showed high potential of antioxidant activity. But *T. pubescens* exhibited high activity ($IC_{50} = 19.1 \pm 0.1 \mu\text{g/mL}$) in compared with *T. kotschyanus* ($128 \pm 0.9 \mu\text{g/mL}$) and control BHT ($18.2 \pm 0.3 \mu\text{g/mL}$). In addition phenolic compound of *T. pubescens* ($244.8 \pm 2.2 \mu\text{g/mg}$) was more than *T. kotschyanus* ($117.1 \pm 09 \mu\text{g/mg}$). But the total flavonoid compound (in contrast to phenolic results) in *T. kotschyanus* extract was higher ($36.07 \pm 07 \mu\text{g/mg}$) than *T. pubescens* ($25.5 \pm 04 \mu\text{g/mg}$).

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**IN VITRO CALLUS INDUCTION FROM DIFFERENT EXPLANTS OF
SAGE (*SALVIA OFFICINALIS* L.)**

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Salvia officinalis L. is a perennial herbaceous plant which is native to the Mediterranean region, especially in the area of the Adriatic Sea and is cultivated to some extent in different European countries. The extracts and essential oils of this plant are used as spices and for healing of different diseases. The plant is appetizing and promotes digestion of food. In this study the effect of plant growth regulators NAA (1.0, 0.5 mg/l) and BAP (0.1, 0.25 mg/l) in callus formation of some explants such as cotyledon, hypocotyl and root through measuring of callus weight, was evaluated. A factorial experiment in the form of randomized completely design with 12 treatments and 3 replications were carried out. The result showed that the highest weight of callus was obtained in MS medium containing 1.0 mg/l NAA+ 0.1 BAP with using hypocotyl as explant. The lowest weight of callus was produced in MS medium containing NAA (0.5 mg/l) +BAP (0.1 mg/l) with using root as explants. Also it has been shown that the effect of explant, culture medium and interaction of explant× medium was significant (p<0.01). More ever, the results showed that in MS medium containing 1mg/l NAA+0.1 mg/l BAP was more effective on callus induction, from hypocotyl explant.

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COMPARISON OF CYTOTOXIC EFFECT OF AQUEOUS AND
METHANOLIC EXTRACTS OF *PTEROCARYA FRAXINIFOLIA*
LEAVES ON HT-29 AND K562 CELL LINES

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Cancer is a major cause of death worldwide and causes serious problems in human life, including mental and physical agony and economic strain [1]. Chronic myeloid leukemia (CML) is a malignant clonal disorder of hematopoietic stem cells which results in increase of myeloid cells, erythroid cells and platelets in the peripheral blood and hyperplasia in bone marrow [2]. Colorectal cancer (CRC) is the third most common cancer in both males and females [3]. *Pterocarya fraxinifolia* (Lam.) Spach (Juglandaceae) is widely distributed in northern area of Iran [4]. The research evaluates the cytotoxic effect of aqueous and methanolic extracts of *Pterocarya fraxinifolia* leaves on HT-29 and K562 cell lines as a model of colon carcinoma and chronic myeloid leukemia. Leaves of *Pterocarya fraxinifolia* collected from Astar city and extraction using soxhlet method for 12 hours performed. HT-29 and K562 cells were cultured and treated with concentrations of extracts (12/5-400 µg/ml). Cytotoxicity of *Pterocarya fraxinifolia* extracts against cancer cells was estimated by the MTT test method. The absorbance was measured using an ELISA plate reader at 540 nm [5]. Aqueous and methanol extracts showed the cytotoxic effect respectively with the $IC_{50}=368.8571\pm 27.68526$ and 291 ± 11.17351 µg/ml on HT-29 and also showed the cytotoxic effect with the $IC_{50}=183.14\pm 12.04$ and 226.02 ± 27.6 µg/ml on K562 cell line. Considering the cytotoxic effect methanolic and aqueous extracts of *P. fraxinifolia* leaves the plant can be considered as a potential candidate for further studies on colon cancer and leukemia treatment.

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INVESTIGATION OF ALLELOPATHIC ACTIVITY OF MEDICINAL
PLANT *VINCA ROSEA* L. ON SEEDLING GROWTH OF THREE TEST
PLANT SPECIES

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The ethanolic extract obtained from dried *Vinca rosea* leaves was evaluated in vitro to examine its potential allelopathic effects. 10%, 5% and 2.5% (w/v) concentrations were prepared from 10% w/v stock solution [1]. Distilled water was used as control. The inhibitory effect of extract on germination and seedling growth of Secale Cereale (*Secale montanum*), redroot amaranth (*Amaranthus retroflexus*) and FLixweld (*Descurainia sophia*) plants were tested. The results showed significant inhibitory effects on germination percentage, radicle length and hypocotyle length at 10% and 5% concentrations of test extract on *A. retroflexus* and *D. sophia*. However, little effect was observed on same parameters of *S. montanum* in the presence of 10% extract solution. There was no documented significant effect for 2.5% extract concentration in three tested plant species.

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EFFECTS OF AROMATIC WATER OF *SALIX AEGYPTIACA* L. AND ITS MAJOR COMPOUND, 1, 4-DIMETHOXYBENZENE, ON RABBIT BEHAVIOR PATTERN

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Today, despite the fact that natural remedies are safer than synthetic drugs, identification of side effects of drugs with natural origin is considered [1]. The aromatic water (AW) of *Salix aegyptiaca* L. (SA) as a natural drug product has been prescribed for various conditions like jaundice, cholelithiasis, cholecystitis, arthritis, rheumatism, fever, hypertension and heart problems, headache, insomnia and anxiety in traditional medicine [2,3,4,5]. The purpose of this study has been to survey behavioral disorders due to use of this AW and its major compound, 1,4-dimethoxybenzene (DMB) in rabbit.

DMB concentration in AW was measured by gas chromatography. This study was conducted in a period of 28 days. Here, forty rabbits were divided into five equal groups: negative control (NC) group was daily gavaged with 10 ml distilled water; SA1 and SA3 groups were daily gavaged with 10 ml AW contains 1 mg/dl and 3 mg/dl essential oil respectively and DMB1 and DMB3 groups were daily gavaged with 10 ml solution of 0.6 mg/dl and 1.8 mg/dl DMB respectively. During the study, water and food intake was daily measured. To investigate the pattern of behavior, on the last day of the study, three animals from each group were randomly selected and the open-field behavior of them was recorded by the camera in a separate cage. Data about the type of behavior, the behavior repetition frequency and the total duration of behavior in 24 hours (in minutes) were extracted from the film prepared. Food intake was significantly increased in response to AW but not significantly increased in response to DMB, although water intake was similar among all groups ($p < 0.05$). Rate of the grooming behavior was virtually unchanged, but rate of sleepy, normal and abnormal behaviors in all the groups receiving AW and DMB compared to NC group was more (DMB group was higher than the water group) ($p < 0.05$). Sleepy effects of DMB was more than AW, but caused some types of abnormal behaviors and increased incidence of some types of normal behaviors.

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**THE POTENTIAL OF ESSENTIAL OILS OF *SATUREIA HORTENSIS*
AND *ZATARIA MULTIFLORA* TO CONTROL RUMINAL ACIDOSIS**

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In ruminants, lactic acidosis occurs after high consumption of soluble and readily available carbohydrates. In this metabolic disorder, due to overproduction of organic acid rumen pH declines which in turn negatively affects rumen microbial populations. In intensive system of ruminant management which high amount of nonfiber carbohydrates are consumed, 10 to 50 percent of animals shows the symptoms of disorder and approximately 90 percent of affected animals die [1]. High concentrate diet results in changing microbial population and accumulation of lactic acid in rumen. There are two groups of ruminal microorganisms in terms of lactate metabolism, including producers and utilizers of lactate [2]. Lactate acidosis is caused by rapidly increasing number of lactate producers (i.e., *streptococcus bovis*) and decreasing the number of utilizers [3]. One way to control acidosis is the application of antibiotics as feed additives. However, using these additives has been criticized due to the emergence of antibiotic resistance. An alternative is natural compounds such as secondary plant metabolites which have been studied recently. Essential oils (EO) are compounds which are obtained using steam distillation and are responsible for odor and flavor of plants. Many researchers have shown the antimicrobial effects of these natural products. The aim of this study is to evaluate the ability of different doses of two EO extracted from *Satureia hortensis* and *Zataria multiflora* (SEO or ZEO, respectively) on the control of acidosis. The EOs were dissolved in ethanol and added to Hungate tubes containing 1 g glucose, 0.1 g wheat straw and 10 ml strained rumen fluid of sheep [4]. The doses used in this study were 0, 250, 500, 750 and 1000 ppm. The antibiotic of virginiamycin was added to tubes same as experimental tubes and considered as positive control. All tubes (4 replicates) were incubated for 6 hours and each 2 hours the volumes of produced gas were measured. After termination of incubation the pH of tube contents were immediately determined. Glucose, as a readily fermentable substrate, resulted in decreased pH and increased gas production [5]. In either tested EO increment in doses led to increase pH and decline in gas volume. In comparison with virginiamycin, the dose of 750 ppm of SEO and 500 ppm of ZEO controlled *in vitro* induced acidosis without adverse effect on rumen fermentation. Overall, the result of this study showed that the above mentioned doses of tested EOs have the potential to control acidosis.

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**EVALUATION OF ANTICONVULSANT, ANTIDEPRESSANT AND
SEDATIVE-HYPNOTIC ACTIVITIES OF *ASPERUGO PROCUMBENS*
LEAVES**

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Anticonvulsant activity of methanol extract of leaves of *A. procumbens* were evaluated in male NMRI mice, using pentylen tetrazole (PTZ) and maximal electroshock (MES) models. The results showed that total methanol extract of *A. procumbens* have significant anticonvulsant activity at dose of 20-320mg/kg in MES model (ED_{50} = 173.9mg/kg with 95% confidence interval of 56.204-1869.203mg/kg), but at doses up to 320 mg/kg has no effect in PTZ model. Then, total methanolic extract of *A. procumbens* leaves fractionate with 3 solvents including petroleum ether, chloroform and ethyl acetate and anticonvulsant activity of them was considered. Chloroform fraction showed anticonvulsant activity in MES model (ED_{50} = 202.92 mg/kg with 95% confidence interval 66.034-2723.197 mg/kg). The anti-depressant effects of *A. procumbens* have been assayed by use of forced swim test, on Swiss Webster male mice.

Ethanollic extract of the tested herb was injected Intra-priotoneally to mice in 75 mg/kg, 150 mg/kg and 300 mg/kg doses. All of doses have been prescribed in 10 ml/kg volume. One of the positive control groups was injected with Imipramin (16 mg/kg), and the other group with fluoxetine (20 mg/kg); Normal saline was used in control group. As results show *A. procumbens* have anti-depressant effect in all of doses that was given. The effect of the ethanolic extract of the plant was evaluated using experimental set up. Male NMRI mice in the range of 18-25 g of weight were used in this study. Pentobarbital induced loss of righting reflex was used for evaluation of hypnotic effect of the extracts. Spontaneous activity test was used for evaluation of locomotor activity and the total distance moved by the subjects was analyzed. The ethanolic extracts of the plant in doses 100-800 mg/kg i.p. were tested, and diazepam was used as positive control. The extract significantly reduced the locomotor activity of the mice in dose dependently manner. The time spent in center of the cage by mice was significantly increased by *A. procumbens* indicating possible anti-anxiety effects of the plant. These findings show that the ethanolic extract of the selected plant tested in this study reduce the locomotor activity and this might be because of sedative effect of the extract.



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**THE EFFECT OF CHEMICAL FERTILIZERS ON LAVENDER
ESSENTIAL OIL PERCENTAGE**

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To study the effect of different chemical fertilizers application rates on lavender (*Lavandula angustifolia*), this experiment was conducted in 2012 at Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experimental design was randomized complete block design with three replications. Treatments were N₀P₀, N₀P₁₅₀, N₃₀₀P₀, and N₃₀₀P₁₅₀ kg N and P/ha. Essential oil was produced by hydrodistillation using a Clevenger in 2 hours. Analysis of variance indicated the significant effect of fertilizer application on essential oil percentage ($P \leq 0.01$). Mean comparison showed that essential oil percentage was the highest (0.24%) in N₃₀₀P₀. In other treatments, essential oil percentage was 0.22% (N₀P₁₅₀), 0.21% (N₃₀₀P₁₅₀) and 0.15% (N₀P₀). This experiment indicated that increasing the application rate of chemical fertilizers increased essential oil percentage up to a certain level, but severely decreased it after that level. So, it is not recommended to apply more than 300 kg N/ha, if the objective is producing plants with high essential oil percentage.



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**EFFECT OF CADMIUM TOXICITY ON GROWTH, BIOCHEMICAL
PARAMETERS AND METAL ACCUMULATION IN PARSLEY
(*PETROSELINUM CRISPUM* L.)**

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Toxic metal contamination of soil, aqueous waste streams and groundwater causes major environmental and human health problems [4]. Cadmium has no known physiological function in plants, and it is a highly toxic metal due to its reactivity with S and N atoms in amino acids [3]. In the present work, the effect of different concentration of cadmium (0, 50, 100 & 300 μm) on growth and biochemical parameters were studied in parsley (*petroselinum crispum* L.) seedling at hydroponic condition. A completely randomized design with four treatments and three replications per treatment was used. Determination of protein content by Lowry method was done [5], proline was estimated by Bates et al. method [1] and DPPH free radical scavenging activity measured by Brand-Williams method [2]. The accumulation of cadmium was estimated by using an AAS atomic absorption spectrophotometer, employing method of Woodies et al., [6]. The root and shoot length, number of leaves and plant biomass were decreased with increasing concentration of Cd metals. The results revealed that the application of different metal concentrations was decreased protein content, but the proline was increased. Our results, showed a significant decrease of DPPH activity in treated plants ($P > 0.01$). More accumulation of Cd was observed in aerial parts of treated plant in compared with control

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**STUDY OF THE HAEMOSTATIC EFFECT OF SOME PLANT
EXTRACTS**

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Stop and avoid bleeding is always one of the main goals and wishes of medical sciences, and different Pharmaceutical methods from chemical to traditional medicine and today's new compounds is used and innovated for this purpose. In this study we will review the effects of 9 herbal medicines which their anti-bleeding properties mentioned and reviewed in traditional medicine, and we will show their coagulation effect and finally the mechanism of clot formation will be discussed.

First we will get the extraction of 9 herbs including snakeroot, chestnut tree, white willow, acacia Arabic wild, dragon s blood, pot marigold, incense, sarcocola, and great-nettle by method of ethanol extraction (Moisten) and then these extracts with different subtilities 0.1, 0.2, 0.5 and 1 ml will be added to complete human blood without coagulation materials. After obtaining the clotting time (CT), we will choose three herbs of snakeroot, Chestnut and Acacia Arabic wild and using the citrated plasma, calcium chloride and extract and with Factor assay test, Fibrinogen and also D-dimer measuring the clot making path has been verified. Three herbs of snakeroot, Chestnut and Acacia Arabic wild with the lowest clotting time has been chosen and again with citrated plasma in presence of calcium the clot has been made. After plasma centrifuging the II, IX and VIII factor will be decreased ($P<0.05$), meanwhile the VII factor had remained unchanged ($P<0.05$). The fibrinogen amount has decreased meaningfully ($P<0.05$) and the amount of D-dimer has not a meaningful increasing ($P<0.05$). The extract of the three herbs especially the chestnut will cause the consumption of internal paths factors (IX, VIII, II) and the external path factors had no considerable increasing. This shows that theses herb's extract will cause clotting via internal coagulation path.



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**DURETIC EFFECT OF *ALLIUM PORRUM* L. ETHANOLIC EXTRACT
IN MALE WISTAR RATS**

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Leek (*Allium porrum* L.) is a bulbous perennial plant commonly called leek and widely cultivated as a vegetable throughout the world. Fresh juice of the plant is claimed to be bactericide, hypotensive and digestive properties are also attributed to this plant [1, 2]. Leek is well recognized in traditional medicine as diuretic agent, although no scientific data have been published to support this effect. The aim of the present study was to evaluate the diuretic potential of ethanolic extract of aerial parts in normal rats after oral administration. Ethanolic extract of leek (50, 75, 100, 150 and 200 mg/kg) or the reference drug, furosemide (10 mg/kg) were administered orally to male Wistar rats and their urine output was quantities at several intervals of time after the dose. After single doses of the extract (75 mg/kg), urine output was significantly increased at 4 and 5 hours after treatment, the total volume of urine excreted was similar for the plant extracts and furosemide. The extract and furosemide increased urinary levels of Na⁺, Cl⁻ and creatinine. In conclusion, the ethanolic extract has strong diuretic action confirming their ethnopharmacological use.

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**ANTI-INFLAMMATORY EFFECTS OF *ARTEMISIA DRACUNCULUS* L.
ETHANOLIC EXTRACT IN MICE**

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Artemisia dracunculus (tarragon) is a perennial herb that belongs to the Asteraceae family. Many edible and medicinal uses have been attributed to this species and it is commonly used for flavoring food in many traditional recipes. Tarragon possesses insecticide and radical-scavenging activities. Antifungal, antitumor and DNA damaging effects were also reported for the essential oil of *A. dracunculus* [1-4]. Since the tarragon has been recommended in the literature as a remedy for the alleviating of pain, it was considered worthwhile to investigate the anti-inflammatory effects of barberry fruit ethanolic extract in adult male NMRI mice. The effect of tarragon extract on acute inflammation was studied by ear edema-induced by xylene in mice. The tarragon extract (10, 50 and 100 mg/kg body wt.) was injected intraperitoneally. The control group was intact. In xylene ear edema test, tarragon extract showed significant activity in mice. The present data indicated that the plant has anti-inflammatory effect on mice and the plant should be considered in future therapeutic researches.

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**ESSENTIAL OIL COMPOSITION, FLAVONOID AND ANTHOCYANIN
CONTENT OF ARTEMISSIA ANNUA L. TREATED WITH METHYL
JASMONATE AND SILVER NANO PARTICLES**

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Artemisia annua L. is a traditional medicinal herb belongs to the Asteraceae family. The foliage and in florescence of *A. annua* plants yield an essential oil, with crucial role in plant defense system. Production of these antifungal and antimicrobial compounds [1] can be induced by certain elicitors. Silver Nano particles (AgNPs), with function of disrupting the structure of the cell membrane, and methyl Jasmonate (MeJA), with involvement in signaling transduction, developmental processes and defense response, are of well-known elicitors. In this research, chemical composition of essential oils isolated from aerial parts of *A. annua* in pre-flowering stage treated with 0.4, 0.8 and 1.2mM AgNPs and 50 and 100 μ M MeJA were investigated by GC and GC-MS. In addition, total anthocyanin, MDA (malondialdehyde) assay, DPPH radical scavenging activity and total Flavonoid content were determined. Treatment of the plants with MeJA and AgNPs resulted in increase of anthocyanin content, although not efficient to reduce peroxidation of membrane lipids.

A total of 15 components were identified as essential oil of the plants with or without treatment with MeJA and AgNPs. High content of Camphor was observed in essential oils of plants treated with 1.2 mM AgNPs (6.61%). The most value of Germacrene-D and trans-caryophelene were observed in plants treated with 50 μ m and 100 μ m MeJA (11.02% and 9.67%). The high concentration of β -selinene was observed in plant treated with 0.4mM AgNPs (23.02%). The plants treated with 1.2mM AgNPs showed the highest content of Artemisia ketone (9.68%). Treatment with 1.2mM AgNPs and 50 μ M MeJA resulted in remarkable increase of oxygenated monoterpenes. The results suggest that high concentrations of AgNPs and MeJA hindered biosynthesis of longer terpenoids so that monoterpenes were more abundant than sesquiterpenes in treated plants, compared to non treated ones.

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**THE EFFECT OF SPRAYING THE METHANOL SOLUTION ON
MORPHOLOGICAL CHARACTERISTICS OF PLANTAGO PSYLLIUM**

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In order to evaluate the effect of applying different densities of methanol and ethanol on plant height, crown diameter, number of auxiliary shoots, number of leaves per plant and leaf width of *p. psyllium*, a full study has been carried out in a lab in the fall of 2011, in institute of medical plants in a full random plan by 3 and 12 repetitions. Regarding this, the effects of spraying different levels of methanol (10, 20, 30, and 40 of volume ratio percentage) and ethanol (10, 20, 30, and 40 of volume ratio percentage) and equal combination of methanol and ethanol (5, 15, 25 of volume ratio percentage) and control group (without spraying the solution) have been taken into study. The study results showed that the effect of experiment treatments on plant height and crown diameter is ($p < 0.05$) and on number of axillaries shoot, number of leaves per plant and leaf width is ($p < 0.01$). In this research the maximum plant height and crown diameter are achieved by using methanol 30% and the least ones were observed in control group, also the maximum number of auxiliary shoots, number of leaves per plant and leaf width has been obtained by using methanol 20% and the least ones were observed in control group.

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**MICROALGAE DUNALIELLA SALINA AS A FUNCTIONAL FOOD
AND NUTRACEUTICAL SOURCE**

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The marine environment represents a relatively untapped source of functional ingredients for health maintenance and the prevention of chronic diseases like various forms of cancer, coronary heart disease (CHD), premature aging and arthritis. *Dunaliella salina* is the most suitable organism for the mass production of β -carotene as it can produce β -carotene up to 14% of its dry weight [3]. Additionally it has been observed that, under irradiance stress, *Dunaliella salina* can accumulate significant amounts of carotenoids which possess unique biological properties [7]. This microalga can also be cultivated easily and quickly when compared to plants and produces both *cis* and *trans* isomers of carotenoids for high bioavailability and bioefficacy in comparison with synthetically produced β -carotene [4-6].

For the experiment samples uptake from Hoze-soltan lake. 0.1 ml of sample spread on petri plates containing modified Johnson medium and incubated under continuous illumination. *Dunaliella salina* cells from microcolonies isolated by micromanipulation and single cell isolation techniques. Isolated microalgae cultivated until the optimum cell density achieved. 20 ml of mother culture inoculated in 400 ml Johnson medium with 10% NaCl and pH: 8.5. Growth rates of sample was measured spectrophotometrically at 680 nm, cells were counted using light microscope and hemacytometer during growth period. Carotenoids were extracted from pelleted biomass by acetone/water solvent and estimated spectrophotometrically in 450 nm. Standard β -carotene was used for obtaining calibration curve [1, 2]. Growth rate were measured during 6 weeks. The results show that in about 33 days, we can obtain the max cell count in cultures. Growth curve from cell count measurement and optical density measurement are compatible. Carotenoids content reached the max at day 35. The carotenoids accumulation was affected by the culture growth stage. Carotenoid production in sample was about 10 mg/lit in average and in day 42 reached to 14.95 mg/lit.

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ASSESSMENT OF DIFFERENT PLANT DENSITY AND ARRANGMENTS
ON QUANTITATIVE AND QUALITATIVE PERFORMANCE OF
CALENDULA OFFICINALIS L.

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In order to determine convenient plant density and arrangement on quantitative and qualitative performance of *Calendula officinalis* L. herb, an experiment was carried out in research field of Soha Jisa agro-industry Corporation in 2011-2012. Applied experimental design, was factorial design in the form of randomized complete block design with three replicates. Experimental treatments have been consisted of the distance between the row in two levels of $R_1=30$ cm, $R_2=40$ cm and the distance on the row in three levels of $I_1=10$ cm, $I_2=20$ cm, $I_3=30$ cm and the cultivation method in two levels of $P_1=$ rectangular and $P_2=$ zigzag. Studied characteristics consisted of the number of flowers in plant, flower dry weight, flower diameter size and flavonoid content. The results showed that the plant density and arrangement had significant effect at 1% ($p \leq 0.01$) and 5% ($p < 0.05$) level on the number of flowers in plant, flower dry weight, flower diameter size and flavonoid content. Also the maximum number of flowers in plant and maximum flower dry weight obtained in 30 cm distance between the row and 20 cm distance on the row treatment and zigzag cultivation method ($R_1 \times I_2 \times P_2$). As, maximum flower diameter size and flavonoid content obtained in 30 cm distance between the row and 30 cm distance on the row treatment and zigzag cultivation method ($R_1 \times I_3 \times P_2$) [1, 2].

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ESSENTIAL OIL COMPOSITION OF *ROSA FOETIDA* FROM IRAN

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In the present study, essential oil composition of *Rosa foetida* has been studied for the first time. *R. foetida* Hermann (Rosaceae) is a dense shrub with bright yellow and aromatic flowers which is growing in the north and west of Iran [1]. The petals of *R. foetida* were collected at floral budding stage from Shekar-nab village (36° 14' N, 50° 24' E at an altitude of 1970 m), Qazvin Province, Iran. The essential oil from fresh and dried petals were isolated by hydrodistillation and analyzed by GC-FID and GC/MS [2,3]. In total, 27 and 14 compounds were identified and quantified in fresh and dried petals of the plant, representing 95.3% and 97.6% of the total oil, respectively. The major components were *n*-nonadecane (23.6-39.2%), *n*-hexadecanol (18.1-24.1%), *n*-heneicosane (16.7-17.4%), *n*-tetradecanol (4.2-6.3%) and pentadecanone (3.0-4.4%) in both essential oil of fresh and dried petals. Aliphatic hydrocarbons were the main group of compound.

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**ETHNO-PHARMACOLOGY OF *FERULA GUMMOSA* BOISS. AND
FERULA ASSA-FOETIDA AMONG KURMANJ PEOPLE OF
NORTHERN KHORASAN PROVINCE**

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Kurmanji is one of the main Kurdish dialects, kurmanj people live in Northern Khorasan and north of Razavi Khorasan provinces in Iran. They have long history of using medicinal plant. Khorasan province with ecological variation has good potential for growth of many wild medicinal plants. *Ferula gummosa* Boiss. and *Ferula assa-foetida* belongs to Apiaceae family, in the Kurmanji dialect they are called, respectively, "Qasny" and "Iram-loti". These two are the most important medicinal plants mountainous steppic region in Iran, which have been used long times ago in traditional uses as antiseptic, antispasmodic, anti-inflammatory and anti convulstant [1,2]. In this research, an ethno-pharmacological survey, field observation, investigation and deep interviews with old rural healers were performed via trip in the late spring 2012. Data about medicinal parts and how to use and performance of *F. gummosa* and *F. assa foetida* were obtained by the rural healers. Local research questions was done in age range of 30-60. Ethno-pharmacological results showed that the root and gums of *F. gummosa* has been used in traditional medicine of this region as antiseptic, antispasmodic, anti-inflammatory, anti convulstant, epilepsy and analgesic to treat of headach, migraine, wound and ulcers and they burn its root to use the smoke for infection of environment, prevention of catching cold, allergies, coughing and rheumatism. For abdominal pain and diarrhea, its root mix with aerial shoot of *Teucrium* and Yarrow (eating powder form). *F. assa-foetida* has been used in traditional medicine of this region as anti convulstant, antiparasitic, antiseptic, antispasmodic. In Kurmanj tribes the gum of *F. assa-foetida* has most usage for excretion of parasites in humans, the roots this plant is used in eradicating agricultural pest. So releasing its extract by flow of irrigation water in the farmland, prevent activity of root eaterworms and larvae.

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**DETERMINATION OF TOTAL ANTIOXIDANT EFFECT OF SIX
IRANIAN POMEGRANATE FLOWERS BY HPLC-DPPH**

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Six species of pomegranate (*punica granatum* L.) flowers (Malase Yazdi, Rabbabe Fars, Shisheh Gape Ferdows, Daneh Siyahe Esfahan, Gojaghe Ghom and Golnar) were studied for the quantification of the total antioxidant effect by HPLC-DPPH. The total antioxidant effect was measured using the DPPH reagent. The antioxidant effect in the pomegranate flower varieties ranged from Malas has the highest antioxidant value, 1.16 microgram of vitamin E, and Dane Siah has the lowest value, 0.09 microgram of vitamin E. The results showed that total antioxidant effect of pomegranate flower is not similar to its peel and can be introduced as a potent source of natural antioxidants.

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**STUDY OF DRY MATER YIELD, AND ESSENTIAL OIL PERCENT IN
THREE SPECIES OF SATUREJA (*S.RECHINGERI*, *S.KHUZESTANICA*
AND *S. MUTICA*) GROWN IN KHORRAMABAD CLIMATE
CONDITION**

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In order to study of dry mater yield and essential oil efficiency in 8 accession of three species Saturja as: *S. rechingeri*, *S. khuzestanica* and *S. mutica* in agricultural research station of khorramabad, the experiment was carried out during 2010. Seeds of the accsesion were sown in pots and transferred to field in 14-16 leaves stage seedling. The spaced plants were arranged using randomized completely block with three replications. For measurement of essential oil efficiency, in the flowering stage, the foliages were harvested and dried. The essential oil was extracted by vapor method distillation. The essential oil production was calculated by dry matter yield x oil%. Data were collected and analyzed for yield and morphological traits. The means of treatments were compared using DMRT method. The results showed significant differences between species and accession within species for all of traits except plant surviving rate ($P < 0.01$). The species of *S. mutica* dry matter yield, oil efficiency, oil yield, had higher values than means of two other species. In comparison among accessions, *S. mutica* from Khorassan had higher production for dry matter yield and essential oil yield, respectively. Results obtained in this study showed that dry matter yield and oil content of *S. mutica* is more than *S. Khuzestanica* and *S. rechingeri*. This species can be introduce as a suitable species for domestication and cultivation in Khorramabad



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SCREENING THE POTENTIAL ALLELOPATHIC CHEMICALS FROM
THE MEDICINAL PLANT OF *ARTEMISIA SIEBERI*

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The medicinal plant of *Artemisia sieberi* spread in extensive levels from steppic and semi steppic range land of Iran. Some phytochemical constitute of terpenoid, phenols and saponins are present in this plant. An examination was undertaken to assess the allelopathic potential of various concentrations of *Artemisia sieberi* viz. 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 on physiological (chlorophyll) and biochemical (phenols content), elongation of radicle and shoot, germination percent of accompanying plant i.e. *Medicago minima* seed to randomized completely design at three replications. The results of this study showed that radicle length significantly was stimulated with an increase of amount of concentrations as compared with control. On the contrary, various concentrations except 10% remarkably decreased seed germination. The greatest hamper effect was caused by 100% concentration about 43.08% over control. The content of chlorophyll as well as elongation of shoot also inversely decreased with an increase of concentration. The content of phenols increased by whole concentrations of selected plant on the shoot of *Artemisia sieberi*. It is concluded that combination of allelochemicals which are present in different concentrations might be acted positive and negative action at cellular level on the different parameters of test seed.

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MODIFIED DNA EXTRACTION METHOD IN *MYRTUS COMMUNIS*
FOR OPTIMAL PCR AMPLIFICATION

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Myrtus communis L. is one of the important aromatic and medicinal species of Myrtaceae family. The myrtle shrubs grow wild in the coastal regions, the internal hills and the forest areas of Mediterranean countries. The plant contains many biologically active compounds and phytochemicals such as phenolics and essential oils. Phenolic compounds in most plant species lead to DNA oxidation during DNA extraction process. In this study three extraction methods including Murray and Thompson [2], Dellaporta [1], and Pirtilla [3] were compared in myrtle leaves. Results showed that modified Murray and Thompson method had higher quality of DNA compared with others. Furthermore, the use of 100 µl 2-Mercaptoethanol along with 100 mL PVP (Polyvinyl pyrrolidone) decreased the oxidation in final DNA extract. CTAB was used in 5% concentration. The DNA extracts of three methods were tested for PCR amplification. ISSR markers were applied to check the quality of bands in which Modified Murray and Thompson had the sharpest banding pattern compared with other extraction methods. It might be due to higher purity of the DNA extraction method used in this study.

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**SUSTAINABLE BENEFICIARY OF SAVORY GENETIC RESOURCES
IN LORESTAN PROVINCE**

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Growing medicinal plants as raw material for the production of herbal medicines without the proper planning and development of appropriate planting and management, degradation of nature, a large part of the trade of medicinal plant species have been collected from nature, and sometimes this wrong way, leads to the extinction of species biodiversity of the region and the world (WHO, 2003). Lamiacea family is one of different family of medicinal plants that are considered, various species of the genus *Satureja* is as long as the plants are considered to be important. Three species on 8 accetions Savory *Satureja khozestanica*, *S. mutica* and *S. rechingeri* experiment was conducted at Agricultural Research Station of Khorramabad. Seeds of each species were collected from natural habitats, and the production of seedlings grown under field conditions. Basis of drip irrigation was used and, morphological traits and essential oil yield in the experiment were measured, analysis of variance showed that within species, between species and between accetions study evaluated the traits except survival score (between species) at 1 and 5% probability level was significantly. *S. mutica* species with an average height of 45.27 cm, number of main branches 10.3, canopy diameter 73 cm, 630 kg of dry matter per acre, yields 0.99% performance Essence 7.81 kg/ ha than the other two species was statistically superiority. In comparison accetions, the No. 2 accetion *S. mutica* (from Khorassan) by producing 2079 kg branch and 17.8 kg of oil per hectare will produce more oil. *S. mutica* species for culture in the region is best studied species.



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**ARTEMISIA SPECIES FROM IRAN ARE DIFFERENT IN
ANTIOXIDANT ACTIVITY AND TOTAL PHENOL CONTENT**

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Artemisia (Asteraceae) is one of the largest and most widely distributed genus in the Anthemideae tribe, which contains different valuable secondary metabolites such as coumarins, flavones and terpenes and essential oils. Some substances from the genus have shown anti malaria, anti cancer, anti diabetic and antioxidant properties. In the current study free radical scavenging activity of extracts from 20 *Artemisia* species were collected from different region of Iran was determined using DPPH method. Total phenolic compound content was determined by the Folin-Ciocalteau method. All species except of *A. hussnenccht*, *A. fragrans* and *A. annua* were shown antioxidant activity under investigated concentrations. The average of IC₅₀ was shown to be variable among different species with a range of 200-650. The highest antioxidant activity was measured in *A. absinthium*. Total phenol content showed variable range of 125-236 mg/g dry weight among different species with the highest and lowest content in *A. marschelliana* and *A. fragrans* respectively. Results confirmed that *Artemisia* species from Iran are rich in case of antioxidant activity and therefore, could be considered as valuable resources towards drug production against oxidative stresses.



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VARIATION OF *TRANS*- ANETHOL CONTENT IN FENNEL
(*FOENICULUM VULGARE*) DURING DIFFERENT DEVELOPMENTAL
STAGE

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Fennel (*Foeniculum vulgre*) is an important plant with different medicinal application. This plant belongs to Apiaceae family. All parts of the plant are beneficial for extraction of essential oils. The major compound of fennel is anethole. This compound is variable in different developmental stage. In this study, the leaves of fennel were sampled in three developmental stages in a sample collected from Shiraz. The phases included young, mature and old leaves. Essential oils were extracted using Clevenger apparatus. The essential oil yield was about 0.9% in young leaves, but there was no significant differences among three stages of development in regards to essential oil yield. Gas chromatography/mass spectrometry analysis showed that young leaves contained the highest levels of t-anethole in vegetative phase (57%). Production of t-anethole begins early during leaf development but it continues to seed developmental stage. In reproductive phase, t-anethol accumulates highly in seeds and the level of accumulation in leaves decreased. The highest level of t-anethole was found in developing fruits (seeds and pods), followed closely by flowers, while t-anethole levels is undetectable in roots. The previous researches reported up to 80% of t-anethol in some collected seeds. Higher fruit development can lead to the lack of further metabolism and minimal volatilization, as indicated by apparent high lignification of the cells lining the oil ducts. This phenomenon can also be observed in the leaves. For instance, modifications such as lignification, suberification or serification in leave epidermis can affect the trichorm frequency and oil ducts as the secretary tissues. Consequently, the old leaves and fruits might have less volatile constituents such as t-anethol. Moreover, low levels of methylchavicol as a substrate for t-anethol synthesis observed in developing fruit flowers, which confirm the results of present study and the previous reports. However the fennel genotypes and the environmental fluctuation can be effective for t-anethol content in fennel.

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**EFFECT OF SALTY SOLUTIONS OSMOPRIMING ON GERMINATION
AND SEEDLING GROWTH OF *CYNARA SCOLYMUS***

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Germination stage is one of the important stages seedling growth of *cynara scolaymus* that osmopriming conditions can affected it. In order to salt solutions osmopriming on Germination and seedling growth of *cynara scolaymus* was conducted in a factorial completely randomized design with three replications. The first factor was salt with two levels (NaCl and CaCl₂), second factor was concentration with five levels (0, 50, 100, 150 and 200 mM) and third factor was time of osmopriming with three levels (8, 16 and 24 h). Results showed that all main effects and salt × time, concentration × salt and concentration × time interactions had significant effect on germination rate, germination percentage and root length but salt × time had not significant effect on shoot length. Salt × time × concentration had significant effect on shoot length. Sodium chloride was more effective in reducing the germination percentage and germination rate, root length and shoot length parameters. Based on results, with increasing salt concentration, germination rate is markedly reduced and increasing the salt concentration caused to root and shoot length decreased. With increasing Priming time, decreasing effect of sodium chloride on of germination rate and percentage was more than calcium chloride and shoot length was also a decreasing trend. With increasing concentration in longer times, germination rate and percentage reduced and root and shoot length showed no uniform trend, however, the mean concentration of 200 mM was the lowest. Root and shoot weight parameters are also showed insignificant differences in all treatments. [1]

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VARIATION OF THE ESSENTIAL OIL YIELD AND COMPOSITION
OF *PELARGONIUM GRAVEOLENS* L. UNDER NANOSILVER
PARTICLES TREATMENT

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Pelargonium graveolens (Family Geraniaceae) with common name geranium is a highly valued aromatic plant and is the only source of one of the most important essential monoterpene oil(s). Their leaves, green branches and fresh flowers contained essential oil of several medicinal values (as anti-depressant and antiseptic effects and reducing inflammation [1]). Among the latest line of technological innovations, nanotechnology occupies a prominent position in transforming agriculture and food production. The development of nanodevices and nanomaterials could open up novel applications in plant biotechnology and agriculture [2]. Experiences gained from these fields facilitate the development of plant protecting chemicals and precision farming techniques. Therefore, the aim of the present study was to reveal the effect of different concentration of nanosilver particles (NSP, 33 nm diameters) including 0, 20 and 40 $\mu\text{m.L}^{-1}$ on essential oil yield and composition of *P. graveolens*. Plants were grown in a greenhouse conditions and exposed foliarly to a range of NSP concentrations (0, 20 and 40 $\mu\text{m.L}^{-1}$), which is applied from beginning flowering phase up to full flowering stage and then harvested for essential oil extraction. The oils were isolated from aerial flowering parts of the plants by hydro-distillation method using Clevenger's apparatus and then subjected to GC and GC-MS analyses to determine the constituents. 26 compounds accounting for 97.1%, 98.5% and 89.1% of the oil were identified in 0, 20 and 40 $\mu\text{m.L}^{-1}$ NSP, respectively. The oil of *P. graveolens* plants was rich of monoterpenes under all employed treatments. The main oil components identified were citronellol (51.4%, 49.3% and 49%), citronellyl formate (11%, 15.8% and 17.9%), geraniol (8.2%, 8.7% and 4.4%), iso-menthone (5.9%, 8.7% and 9.3%), aromadendrene (2%, 2.3% and 1.1%) and linalool (0.9%, 1.7% and 0.8%) under 0, 20 and 40 $\mu\text{m.L}^{-1}$ NSP, respectively. Also, results revealed that application of NSP in a concentration of 40 mg.L^{-1} increased the essential oil yield in geranium by 13.4% and 25%, over the untreated control and high NSP application, respectively. Small particle size, large surface area and ability to produce reactive oxygen species (ROS) from NSP, all play a major role in plant function, especially secondary metabolite production [3].

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COMPOSITION OF ESSENTIAL OIL OF *LEUCANTHEMUM VULGARE*

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Leucanthemum vulgare Lam. (Asteraceae), is a widespread flowering plant, distributed from Europe to Turkey, Iran and China. In Iran the plant is limited to northwest provinces [1]. The plant is an invasive herb forming dense colonies displacing native plants. Thus as a noxious it could modify plant communities [2]. *leucanthemum vulgare* is a perennial, little branched herb with 1-10 stems per plant. The flower head consist of 22 or more white ray florets surrounding numerous tiny disk florets that are yellow and flowering period is June to August [3]. In the present study, we focus on chemical composition of the essential oil of plant flowers. The hydrodistillation of the dried inflorescences of *L. vulgare* which was collected from Heyran (Ardabil), afforded a greenish yellow oil with a yield of 0.15% (V/W). The oil was analyzed by GC-MS apparatus. Our result showed that the essential oil comprised of 50 compound and 90.33% of total oil were identified. The oil was dominated by Caryophyllene oxide (21.2%) and Aromadendrene oxide (13.72%) as major compounds and Z- β -Farnesene (6.52%), 1-Octen-3-ylacetate (5.6%), trans Caryophyllene (4.85%). Comparison of our result with those of Ain Roal et al. 2010 showed the essential oil composition profile of *L. vulgare* collected from Iran is different to those of Georgia [4]. This is assumed that two samples of *L. vulgare* might be considered as different chemotypes.

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**EVALUATION OF THE PHENOL AND FLAVONOID CONTENTS IN
SOME LOCAL AND FOREIGN APPLE CULTIVARS**

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Phenolic compounds are a vast group of plant secondary metabolites. In recent years, these were considered to be important due to their antimicrobial and antioxidant activities. Phenolic content of plants may be affected by genetic factors, environmental and storage conditions and their value may even be different among different varieties of the same species. Furthermore, ripening status and harvesting time also affect the level of phenolic compounds. In the present study, total phenol and flavonoids were measured in fruit flesh of Azghandi, Mohalikharve, Red spare, Esherman, Yellow spar, Red delicious apple varieties. The experiment was performed as a complete randomized design with three replications. The results revealed that these varieties are statistically different with regard to their phenolic contents. The highest phenol and flavonoid contents were recorded in Red spare (3.499 mg/g) and Azghandi (0.0072 mg/g), respectively. The lowest value of these components was found in Red delicious (1.512 mg/g) and red spare (0.0033 mg/g) respectively.

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**THE EFFECT OF IRRIGATION AND TIME OF MICRONUTRIENT
FOLIAR APPLICATION ON YIELD AND YIELD COMPONENTS OF
BLACK CUMIN (*NIGELLA SATIVA L.*) IN BIRJAND AREA**

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In order to study the effect irrigation and time of micronutrient foliar application on yield and yield components of black cumin (*Nigella sativa L.*) a field experiment was conducted in spring 2012 at Islamic Azad university of Birjand, college of agriculture experimental station. Studied factors were time of micronutrient foliar application with 2/5% doze at three times [1-control , 2-at 6-8 leaves stage, 3-at starting flowering and 4-100% flowering] and irrigation at three times(6,12 and18 days) that investigated as split plot based on completely randomized block design. The treat was biological yield/ha, weight of capsule, seed yield/ha, harvest index, number of capsule per plant, 1000 seed weight and number of seed per capsule. Time of irrigation has significant effect on all treats except number of capsule per plant and 1000 seed weight and number of seed per capsule. The time of micronutrient foliar application has significant effect on biological yield/ha, seed yield/ha, harvest index. The effect of irrigation and time of micronutrient (Fe +Zn) foliar application has significant effect on seed yield. The highest yield was obtained from the time of 6 days irrigation (736/667 kg per ha) and the best time for micronutrient (Fe +Zn) foliar application was at starting of flowering. It seems that irrigation at 6 days and micronutrient (Fe +Zn) foliar application at starting of flowering had the best effect on *Nigella sativa* in Birjand.



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**PHYTOCHEMISTRY STUDY ON THE TWO SPECIES OF ACHILLEA
IN DIFFERENT REGION**

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Achillea pachycephala and *Achillea nobilis* are important species of Astraceae. This plant grows in different region of Iran. An experiment was conducted to analyzing the percentage and various structures of essential oil in two species i.e. *Achillea pachycephala* and *A.nobilis* from aerial parts of them in Khomin and Taybad region at 2011 respectively. To screen essential oil from various treatments the essential oil distillation method (Clevenger Apparatus) was applied. Then the percentage of different structure of essential oil in each species was detected and measured by gas chromatography (GC). Analysing of the result showed that the species of *A. Pachycephala* had a higher percent of the essential oil (0.74-0.85) as compared with other studied species (1.12-1.28). 32 compounds were identified from both of the species. The compounds of α -Thujone (33.56 %) and α -Cubebene (15.15 %) were highest in the *Achillea nobilis*. On the contrary the compound of pachycephala carvacrol (19.78 %), β -Eudesmol (8.34 %) were maximum in the species of *Achillea Pachycephala*. all the average *Achillea nobilis* had highest essential oil in aerial parts over *Achillea Pachycephala*. it might be concluded that various structures and concentration of essential oil was affect by genetic characteristics of the each species and environmental factors.

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EVALUATION OF SEED GERMINATION IN CUMIN (*CUMINUM CYMINUM* L.) TO DROUGHT STRESS INDUCED BY POLYETHYLENE GLYCOL (PEG) 6000

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To evaluate the response of two ecotypes of cumin in germination stage to drought stress this study was assessed in a randomized complete block design with four replications. Polyethylene glycol (PEG) 6000 were used to simulated drought stress to -0.1, -0.2, -0.3, -0.4 MPa and distilled water were considered as a control. Some traits such as germination rate, root and shoot length, root and shoot dry weight were measured. Results showed that drought stress significantly decreased germination rates, root and shoot lengths in both ecotypes. So that in -4 MPa treatment germination percentage was reduced to 31% in Shiraz ecotype and 22% in Kerman ecotype. Since the length of shoot under drought stress showed less decline compared with length of root, it can be concluded this plant has a special mechanism to reduce the negative effects of drought stress on its shoots.

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**RESPONSE OF MORPHOLOGICAL OF PLANTAGO PSYLLIUM L.
PLANTS TO AMINO ACID ACTIVE COMPOUNDS**

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In recent years, it was found that plants can absorb and use Amino acid as a source of nitrogen. Amino acids are known as bio-stimulators which have a positive effect on growth, yield and significantly reducing the damage caused by critical stress. This study was done to investigate the morphological characteristics of isabgol plants (plant height, number of auxiliary shoot, crown diameter, chlorophyll, number of leaves per plant, number of spikes per plant) under the effect of amino acid in 2011, at the Research Field of Jihad Daneshgahi, as a completely Randomized Blocks Design with 10 treatments and 3 repetitions. The experimental treatment involved amino acid compounds such as (Kadostim, Fosnutren, Humiforte, Aminol forte) in two levels of 0.75 and 1.5 L/ha, full fertilizer (70 kg/ha) but the control treatment had no application of amino acid compounds or full fertilizer. Results showed that significant effects of treatments on the number of auxiliary shoot, number of leaves per plant, number of spikes per plant ($P < 0.01$), plant height, crown diameter and chlorophyll values ($P < 0.05$). in a way that the highest mean plant height, number of auxiliary shoot, number of leaves per plant and the amount of Chlorophyll was gained in treatment of Kadostim 1.5 L/ha and maximum crown diameter got perceived in treatment of Fosnutren 0.75 L/ha, respectively. Results also showed although the highest number of spikes per plant was in full fertilizer treatment, but its difference with treatment of Fosnutren 0.75 L/ha was not significant. The other result showed that synergistic amino acids and macro elements in applied combinations caused an increase in measuring parameters in isabgol plant.

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COMPARISON OF THE EFFECT OF ALCOHOL SPRAY AND BIO-STIMULATORS ON THE MUCILAGE YIELD OF PSYLLIUM

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To evaluate and compare the effect of alcohol spray and bio-stimulators on the Mucilage yield of Psyllium, a research was carried at research field of Medicinal Plants Institute, ACECR in 2010 year. Treatments include ethanol and methanol (10, 20, 30, 40% V/V) and bio-stimulators with commercial formula of Aminol forte, Kadostim, Fosnutren, and Humiforte (0.75 and 1.5 L.ha⁻¹) and control (without spray application). The experiment was a completely Randomized Blocks Design with three replications. Results showed that the treatments had significant effect on mucilage yield ($p < 0.01$). According to these results, spray of bio-stimulators had better effect on the yield of Mucilage rather than the alcohol application and among them, the treatment of Fosnutren 1.5 L.ha⁻¹ had maximum mucilage yield (105.04 kg/ha) while the control displayed minimum mucilage yield (31.63 kg). In commentary of the results in this research, it can be stated that the bio-stimulators could promote the growth and mucilage yield in Psyllium through sustained supply of amino acid and also macronutrients such as Nitrogen, Phosphorus and Potassium. Also, the effect of bio-stimulators applied on the growth and yield of the plant can be far way greater than the alcohol impact for the mentioned plant.

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**EFFECT OF SPREY APPLICATION OF ZINC AND MANGANESE ON
YIELD AND YIELD COMPONENTS OF SAFFLOWER**

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Due to the increasing needs of human, especially in our society to oilseeds; good cultural management for crop production is important issue. Therefore, the effect of spraying application of Zn and Mn on yield and yield components of safflower in 2011 was conducted at Hamadan Agricultural Education Complex. Experiments carried out based on factorial design in a randomized complete block with three replications. Factors were spraying with four levels (control, zinc spraying and spraying manganese) and three varieties of safflower (Sina, Sofeh and Li111). Results showed that between Varieties there was significant difference ($p < 0.01$) in seeds 1000 weight, stem diameter, number of seeds per plant, number of bolls, the plant height and harvest index parameters. Sofeh had stem diameter and plant height higher than other varieties that resulted to had the minimum number of boll per plant. It seems that capability of boll production in Sofeh reduced because of assimilates to produce more stem thickness and plant height. The highest harvest index among cultivars, with an average of 44.05 related to Li111. Sofeh had more number of seeds per plant than other cultivars. Sina had more seeds 1000 weight with 48.28 g than others. Manganese spraying and zinc – manganese spraying had maximum grain yield, biological yield, seeds 1000 weight, stem diameter, number of seeds per plant and plant height. [1, 2]

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THE EFFECT OF *DAPHNE MUCRONATA* LEAVES EXTRACT ON VIABILITY OF PRIMARY RAT GLIAL CELLS

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Daphne mucronata (Thymelaeaceae) is a shrub growing in different states of Iran such as Kerman, Shiraz, Balochistan, Kermanshah, Qasr-e Shirin, Kurdistan and in north west of Iran. Various species of Thymelaeaceae (*Daphne mezereum*) have been used for curing rheumatism, skin diseases, joints pain, some cancers and etc, over the years. Despite numerous reports that show the therapeutic effects of many species of Thymelaeaceae, they are not used in Iranian folk medicine. Their Compounds are mainly coumarins and diterpene esters. It is reported that *D. mucronata* leaves extract have anti-irritant, anti-tumor and anti-proliferative activities. We collected *D. mucronata* from around Yasouj city and alcoholic extract of dried leaves was prepared. Glial cells are nervous system protective that provide nutritional and biochemical materials, and also perform repair processes, immune defense and protect against oxidative stress. Neonatal primary rat glial cells isolated from the rat brain were cultured according to the McCarthy & Vellis method. Cytotoxicity of the alcoholic *D. mucronata* extracts on the treated glial cells with different doses of the extract was investigated by MTT assay and mitochondrial and morphological changes in these cells. The extract did not show cytotoxicity effects at the particular applied doses.

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**FOLIAR APPLICATION OF AMINO ACID ACTIVE COMPOUNDS ON
THE REPRODUCTIVE OF PLANTAGO PSYLLIUM**

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Amino acid active compounds have been considered as biological substances which stimulate in-plants processes. The application of bio-stimulators and free amino acids in the form of spray on different plants indicated an increase in yield. This study was designed to investigate the reproductive of *Psyllium* (spike length, spike width, number of seeds per spike, number of seeds per plant, and seed yield) in the fall of 2011 under the effect of amino acid compounds in Research Field of Jihad Daneshgahi by a completely Randomized Blocks Design with 10 treatments and 3 repetitions. Treatments involved amino acid compounds with commercial formulation of Kadostim, Fosnutren, Humiforte, Aminol forte (0.75 and 1.5 L.ha⁻¹) and chemical fertilizer N, P, K (70 kg/ha⁻¹) and control treatment (without foliar application). Results showed that the effect of treatments on the spike width, number of seeds per spike ($P < 0.05$) number of seeds per plant and seed yield ($P < 0.01$) had a significant effect. Whereas this effect was not perceived on spike length. Therefore, the highest spike width and number of seeds per spike (33.9) in treatment of Fosnutren 1.5 L/ha, the highest number of seed per plant (342.6) and seed yield (445.7 kg/ha⁻¹) were in treatments of Fosnutren 0.75 L.ha⁻¹. According to the results, the use of Fosnutren treatment 0.75 for the presence of P₂O₄ soluble in water in formulation of this treatment and by the components recovery, the yield can be increased.

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VARIATION OF COLCHICINE CONTENT IN DIFFERENT SEASONS
AMONG THREE *COLCHICUM* SPECIES

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In order to comparison of seasonal changes of colchicine content between hysteranthous and synanthous *Colchicum* species, amount of colchicine was determined in *Colchicum speciosum* Steven and *C. kotschyi* Bioss as hysteranthous species and *C. robustum* Stefanov as a synanthous, in different seasons. The results showed that the amount of corm colchicine was higher in *C. speciosum* than the other species in all seasons. The highest colchicine content of corm in *C. speciosum* was obtained in winter and autumn (0.217 and 0.213 wt/wt g %), respectively, while in *C. robustum* and *C. kotschyi* found in autumn, 0.049 and 0.077 (wt/wt g %), respectively. The lowest colchicine content of corms obtained in summer in *C. speciosum* and *C. kotschyi* which the obtained amounts are 0.131 and 0.0058 (wt/wt g %), respectively, whilst in *C. robustum* obtained in winter, (0.008 wt/wt g %). Seed colchicine content in *C. robustum* was observed higher than the other species, generally.

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**DETERMINING THE BEST EXTRACTION SOLVENT OF GLABRIDIN
FROM LICORICE ROOT AND MEASURING IT IN SPECIES NATIVE
TO KERMANSHAH**

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Hyperpigmentation is a common skin disorder that is often seen in women [1]. Because unpleasant physical and psychological effects of this disorder and side effects of existing drugs, to achieve more effective and safer drug compounds particularly with natural origin is considered [2-4]. Among these compounds, glabridin found in licorice (*Glycyrrhiza glabra*) root that inhibits tyrosinase enzyme, has attracted much attention [2, 5]. This compound is more effective than hydroquinone and no side effects have been reported from it [6, 7]. Since Iran is one of the major exporters of licorice root, the purpose of this research is to be taken a step towards commercial production of glabridin [8].

In order to prepare standard glabridin, the dried ethyl acetate extract obtained from licorice (native to Kermanshah province) root was preliminary fractionated by SPE method on silica gel using n-hexane and ethyl acetate and finally glabridin was purified by preparative HPLC (C18 column and methanol-water solvent system). The standard glabridin prepared was used to draw the calibration curve. Then, the best extraction solvent of glabridin was determined by extraction of root with several different solvents and quantification of the extracted glabridin by HPLC. Also in this study, the total amount of glabridin in licorice root was measured. The standard glabridin with 98.78% purity was obtained. Absolute ethanol was determined as the best solvent for the total extraction of glabridin. The total amount of glabridin in licorice root was measured 0.83%. The total amount of glabridin in licorice species of Kermanshah province was in the highest rate reported in the literatures and can say that with regard to the amount of glabridin, licorice roots of Kermanshah region is one of the most desirable species [9].

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**EFFECTS OF DIFFERENT RATIO OF ZEOLITE ON PLANT GROWTH
AND AMOUNT OF GEL PRODUCTION IN (*ALOE VERA* L.) UNDER
DIFFERENT IRRIGATION**

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Aloe vera L. has been used therapeutically, certainly since Roman times. and due to its multiple drug effects has attracted the attention of researchers for long times. This plant is used in various pharmaceutical, food and cosmetic, this variety of usage is an important advantages rather to other planet. Various factors, including the amount of nutrients present in the soil, soil characteristics, climatic conditions, planting area (elevation, temperature, rainfall) and harvest time are factors which affecting plant growth and the amount of produced Aloe gel in its leaves. The purpose of this investigation was to evaluate the effects of Zeolite on the “growth, amount of gel changing and determining the appropriate ratio of Zeolite under different irrigation. It has done as a factorial based on randomized complete block with 4 levels of Zeolite, 0, 11, 22 and 44 grams in 5 kg pots of soil and irrigation in 3 to 7, 14 and 21 days in greenhouse 3 repetition were studied for 5 months. The Aloe plant morphological traits, including body weight, the weight of largest leaves, leaf thickness, weight, gel, gel-to-weight ratio of leaves was investigated. The use of different levels of Zeolite and different treatments of irrigation on the yield of 5% significant difference was observed. The Maximum and minimum weight Aloe plants was observed respectively in 44g Zeolite treatment with 21 days irrigation and no Zeolite treatment with 7 days irrigation. Highest and lowest value of weight leaves and leaf thickness has observed respectively under condition of 44 g Zeolite interaction with 14 days irrigation and 0 Zeolite treatments with 7 days irrigation. Weight of gel by using 44 Zeolite and 14 days irrigation showed the highest amount, so the gel of the leaf weight ratio was highest in this case too. In general, application of using 44 g aluminosilicate Zeolite with 14 days irrigation evaluated as a positive manner.



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**IMPACT OF SALICYLIC ACID FOLIAR APPLICATION ON
GROWTH AND PHYSIOLOGICAL CHARACTERISTICS OF
CALLENDULA (*CALENDULA OFFICINALIS* HORT.) UNDER
SALINITY STRESS**

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Application of Salicylic acid (SA) as a phytohormone has been increased due to resistance to stresses such as salt stress. Pot experiments were conducted to determine the effect of exogenous salicylic acid (SA) application on growth and physiological characteristics of callendula grown under salt stress and greenhouse conditions. For this purpose a factorial experiment based on completely randomized design was conducted with 3 levels of SA (0 (control), 1, 2 mM) and 3 levels of NaCl (0, 100 and 200 mM) with 4 replications. At flowering stage, SA was applied with spraying two times in two week intervals. NaCl was also applied as drench (200 ml per pot) in two day intervals. The results showed that salinity decreased the growth, chlorophyll content, flower number per plant and flower diameter. However, foliar applications of SA resulted in greater root, shoot and total dry weight, plant height and leaf area of callendula plants under salt stress. The highest chlorophyll content was obtained from 2.00 mM SA application in all NaCl treatments. Salinity decreased flower number per plant and flower diameter; however SA increased them under salinity stress. Plants treated with 1.00 mM SA had the highest flower diameter at 100 and 200 mM of NaCl. Electrolyte leakage increased by salinity, however foliar application of SA significantly reduced electrolyte leakage under salt stress. Based on the present results, foliar application of SA treatments can ameliorate the negative effects of salinity on the growth and physiological characteristics of callendula plants.

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**EVALUATION OF PHITOCHEMICAL POTENTIALS AND
SECONDARY METABOLITES OF *SATUREJA HORTENSIS* AND
FOENICULUM VULGARE MILL IN DIFFERENT PHENOLOGICAL
STAGES**

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All cells used antioxidant defense systems to protect against oxidative damage; they can prevent the onset and progressions of many diseases take. Many studies showed that the antioxidant potency of plants changes in phenological stages. *Satureja hortensis* is an aromatic herbaceous from Lamiaceae that is effective for treatment of muscle pain, nausea, infectious disease, and diarrhea [1-4]. *Foeniculum vulgare* Mill is a perennial or two years herb from Apiaceae and in traditional medicine it recommend as carminative, antispasmodic, expectorant, high milk production, and anti-microbial agent [5]. Antioxidant activity of *S. hortensis* and *F. vulgare* had studied by using ferric-reducing antioxidant power assay and inhibition of fatty acid peroxidation assay. Total flavonoid, carotenoid and solution sugar content had determined by colorimetric techniques. The highest antioxidant activity had measured in flowering stage of *S. hortensis* and *F. vulgare*, 0.135mmol/gdw and 0.044 mmol/gdw, respectively. The greatest amount of flavonoid had determined in leaves of *S. hortensis* (4.21 mg/gdw) and *F. vulgare* Mill flower (7.68 mg/gdw) in the flowering stages. Our results shown methanolic extract of *S. hortensis* and *F. vulgare* in flowering and maturing of fruit stages exhibited highest level of antioxidant activity.

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INVESTIGATION THE EFFECT OF INTEGRATED MINERAL
NUTRIENT MANagements ON SEED YIELD AND ESSENTIAL OIL
EFFICIENCY OF FENNEL (*FOENICULUMVULGARE*)

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Fertilizer management is an important factor in medicinal plant cultivation. The identification of environmentally-sound fertilizer could be effective and its had positive impacts on plant qualitative and quantitative indices. In order to study the effects of chemical and biological fertilizers on seed yield and essential oil efficiency of fennel (*Foeniculum vulgare* L.) a field experiment was conducted in Agricultural Faculty of Shahid Chamran University at 2011. Trial study was carried out as two-way factorial which assigned as randomized completed block design (RCBD) with three replications. Chemical fertilizer at the three levels (C1=0-0-0 kg/ha NPK, C2=60-60-48 kg/ha NPK and C3=120-120-96 kg/ha NPK) were first factor, different biological fertilizers at the six levels B1 =control, B2 = Biosuperphosphate+Nitroxin, B3 =Nitroxin, B4= Biosuperphosphate, B5= Biosulphur and B6= Sugarcane waste compost) were the second factor. The result showed that the chemical fertilizer had significant effect on fennel grain yield and essential oil percent. The highest essential oil percent (2.78%) and seed yield (156.3 kg/ha) were obtained at C2=60-60-48 kg/ha NPK and C3=120-120-96 kg/ha NPK respectively. Also, the biological fertilizer had positive impact on essential oil yield and seed yield. The highest essential yield (5.28 kg/ha) and seed yield (192.2 kg/ha) were obtained at sugarcane waste compost treatment. The interaction result showed that the highest (237.7 kg/ha) and the lowest (103.2 kg/ha) fennel grain yield were obtained at sugarcane waste compost in combination with treatment C3=120-120-96 kg/ha NPK and Biosulphur without chemical fertilizer [1,2].

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**PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY OF
ATROPA BELLADONNA.LIN MOUNTAINOUS AREA GOLESTAN
PROVINCE**

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Atropa belladonna (Solanaceae) with locally known as (Shabizak) is one of the most important wild medicinal herb grown in forest road, which has been used in traditional medicine as, analgesic, anti spasmodic, anti inflammatory, anti convulsant, antiepileptic and dilate the pupil of the eye, this features is due to its alkaloids [1, 2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity in plant, the different parts of *Atropa belladonna* were collected of Chaharbagh mountainous village of Golestan province in vegetative period (June 2011), then dried and were extracted by Ethanol %70 solvent. Total phenolics (TP) and total flavonoid (TF) content were determined spectrophotometrically and their antioxidant activity were measured by 1,1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH) method. The findings of phytochemical indicated that the TP contents had range from 3.357 ± 0.148 to 12.738 ± 0.155 mg GAE g⁻¹ and TF contents were 0.93 ± 0.26 to 31.26 ± 5.899 mg QUE g⁻¹. Antioxidant activity (IC₅₀) was measured 781.387 ± 8.242 to 909.49 ± 6.256 mg/ml. Analyses of these results showed that the leaves extract have the highest content of Tp and Tf compounds, and flowers extract have better antioxidant to compare another parts. We offer to another research about investigation effect of various solvent in release of secondary metabolites in different parts of this plant and survey of their medicinal effects in in vivo and clinical models.

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**EFFECT OF DIFFERENT RATES OF CHEMICAL FERTILIZER (NKP),
MANURE AND MIX OF THEM ON GROWTH, YIELD, AND
ESSENTIAL OIL OF *SATUREJA KHUZISTANICA* JAMZAD**

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To study the effect of Different amounts of chemical fertilizers on growth, yield, and essential oil constitutes of (*Satureja khuzistanica* Jamzad) an experiment was conducted during two successive seasons of 2010- 2011 at the research farm of Kashkan of lorestan, Iran. The experimental design was randomized complete block with three replications and 10 treatments including: different rates of N, P and K with 3 level, Different rate of manure with 3 level, mix of N, K, P and manure with 3 level and control (without fertilizer). Results of two years study showed that none of fertilizers had significant effect on growth, yield, essential oil percentage and chemical components of essential oil in plant. The effect of plant age on all studied parameters except the number of Subsidiary branches, essential oil percentage, p-cymene and μ -terpinen percentage was significant. The highest plant height, plant diameter, herb dry weight and essential oil yield were observed in two year old plant. The amount of p-cymene and carvacrol were higher in two year old plants but the amount of μ -terpinen not affected by age of plant.



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COMPARISON OF MUCILAGE AMOUNT AND MORPHOLOGICAL TRAITS IN NATIVE ECOTYPES OF PLANTAGO IN PLANT IN GOLESTAN PROVINCE

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In order to evaluation of morphological variation and musilage amount in plantago, the pant was collected in four regions in Golestan province (Incheboron, duzavlom, Gharamakher and Aramgah) in random complete block design with 4 replications during 1390 year. The amount and percentage of musilage swell index and swell amount per one gram musilage, different morphological traits included leaf number and length, ear nubmer in plant, ear length, seed nubmer in ear, length of flower and 1000 seed weight were evaluated. The data was analysed by SPSS software. The results of variance analysis shown that the region of collection was significant in leaf length and 1000 seed weight (1%), nubmer and length of ear and swell factor (5%). Generally, the results showed that the highest amount of musilage was observed in Gharamakher ecotype (0.216 g) and no significant difference between ecotypes in regards to musilage amount. The survey of compare means shown that maximum of swell index was obtained in Gharamakher and Aramgah (14.25 ml) and these ecotypes were in one groput with duzavlom ecotype. The Incheboron ecotype had minimum amount in swell index by 13.75 ml.

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**STUDY OF PHENOLOGICAL STAGES IN FOUR NATIVE ECOTYPES
OF PLANTAGO IN CLIMATE CONDITION GOLESTAN PROVINCE
(AZADSHAHR)**

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Plantago ovata is an important medical plant belonging to the family of plantaginaceae. This study was carried out in order to evaluate the time of each phenological stage of *Plantago* in Azadshahr weather condition. The seeds of this plant were collected from 4 different places in Golestan province (Incheboron, duzavlom, Gharamakher and Aramgah) and cultivated in random complete block design with 4 replications in 1390 Esfand. The number of days from seeding to plant emergence and four-leaf, begins of ear, 50% ear, flowering and seed ripening stages. The data was analysed by SPSS software. The results showed that there are significant differences in all evaluated traits and seed origin is effective on phenological stages in these ecotypes. There are significant differences between ecotypes regards to number of days from seeding to plant emergence and four-leaf stage, begins of ear ($p < 0.05$) while There are significant differences in number of days to 50% ear, flowering and seed ripening stages by 1%. Generally, the results showed that Duzavlom ecotype had more time for all stages compared to others ecotypes and the Incheboron was completed its growth cycle in least time (87.75 days).

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**EFFECT OF DIFFERENT LEVELS OF MANURE ON ANISE
ESSENTIAL OIL PERCENTAGE AND YIELD**

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Application of manure, due to lower environmental side effects, is one of the best ways to improve plant nutrition. To study the effect of the different levels of manure on yield and essential oil of anise, this experiment was conducted under field conditions at Research Institute of Forest and Rangelands, Alborz research station in Karaj, Iran, in 2012. This experiment was carried out in the form of a randomized complete block design (RCBD) with three replications. Treatments were 0, 20 and 40 ton ha⁻¹ of fully decayed manure that was added to the plots in the preparation stage. Seeds were dried at room temperature and essential oil was produced by hydrodistillation using a Clevenger in 2 hours. Analysis of variance showed that the effect of manure on the essential oil percentage was significant at $P \leq 0.01$ and was not significant on essential oil yield. Mean comparison showed that the highest percentages of essential oil were 4.68 and 4.69% obtained when 0 and 20 ton ha⁻¹ manure was applied, respectively. According to the results, application of more than 20 ton ha⁻¹, because of stimulation of vegetative growth, could not increase essential oil percentage and yield.



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**CHROMOSOM COUNTING OF SIX POPULATION OF LEONURUS
CARDIACA FROM IRAN**

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This study was carried out on six different populations of *Leonuruscardiaca* to determine the ploidy levels. Seeds were collected from plants in natural habitats in 2012 and germinated on Petri dishes at 25 c. on wet paper. Chromosomes obtained from root tips which had been treated in 8 hydroxyquinolin for 4 h., fixed in carnoys solution for 24h, Hydrolized in 1N HCL for min and stained with aceto-orcein. Our examinations show that the best root size for chromosome study of this species is 0.5 -1.5 cm long and the best time for cutting the roots is about 12 o clock. Also, the results show that all the studied populations are diploid and $2n=18$. This is the first report of Chromosome number of the species *Leonuruscardiaca* in Iran

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**COMPARISON OF ESSENTIAL OIL CONTENTS OF SIX
POPULATIONS OF MOTHERWORT (*LEONURUSCARDIACA*) IN IRAN**

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The main goal of this study is to determine the essential oil content in Motherwort populations as one the index factor in selecting of favorable populations and also domestication of medicinal plants In order to determine the essential oil content, flower and aerial parts of 6 populations; collected from their natural habitats in Kerman, North Khorasan, Alborz, Esfahan, Ardabil, Mazandaran provinces. After drying the samples in shade, essential oils were extracted by water distillation method for 4 hours based on Britain pharmacopeia. The results show that there are significant differences among the habitats. Essential oil yields vary between 0.02 (Taleghan population) to 0.053 (Kerman population) percent (w/w). It can be concluded that the essential oil contents of the species are affected by climate or genetic parameters or interaction between them Key words: Motherwort, polyploidy level, crossing, medicinal plant.

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EVALUATING THE ALLELOPATHIC POTENTIAL OF MEDICINE
PLANT OF *POLYGONUM CONVULVULUS*

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The release of allelochemicals from different ways has an important role in competition of plant. The bioassay method was conducted to survey allelopathic potential from medicine plant of *Polygonum convolvulus* at various concentrations viz. control, 25, 50, 75 and 100 % on different parameters of germination of wheat Kohdasht- cultivar to completely randomized design at three replications in Gonbad Kavous University. The analysis of variance showed that various concentrations of studied plant significantly decreased germinations of parameters at 99% confidence level. The result of mean comparison showed that various concentrations of treatments except 25% significantly hampered radicle and shoot length of test plant. The result of seed vigor was similar with result of above traits. The result of germination revealed that this trait remarkably decreased at 75 (47.94%) and 100 (84.93%) percentage as compared with control. This study show that the higher concentrations of *Polygonum convolvulus* might be have high quantity of allelochemicals which in combination with other allelochemicals had a bigger inhibition effect.

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**PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY OF
ATROPA BELLADONNA.LIN FOREST AREA OF GOLESTAN PROVINCE**

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Atropa belladonna (Solanaceae) with locally known as (Shabizak) is one of the most important wild medicinal herb grown in forest road, which has been used in traditional medicine as, analgesic, anti spasmodic, anti inflammatory, anti convulsant, antiepileptic and dilate the pupil of the eye, this features is due to its alkaloids [1, 2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity in plant, the different parts of *Atropa belladonna* were collected of forest Naharkhoran of Golestan province in vegetative period (June 2011), then dried and were extracted by Ethanol %70 solvent. Total phenolics (TP) and total flavonoid (TF) content were determined spectrophotometrically and their antioxidant activity were measured by 1, 1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH) method. The findings of phytochemical indicated that the TP contents had range from 2.412 ± 0.078 to 11.118 ± 0.317 mg GAE g⁻¹ and TF contents were 1.255 ± 0.33 to 32.103 ± 4.783 mg QUE g⁻¹. Antioxidant activity (IC₅₀) was measured 667.98 ± 15.341 to 1467.47 ± 38.025 mg/ml. Analyses of these results showed that there was a positive correlation between antioxidant activity and secondary metabolites content and the leaves extract with the highest content of Tp and Tf compounds have better antioxidant to compare another parts. We offer to another research about investigation effect of various solvent in release of secondary metabolites in different parts of this plant and survey of their medicinal effects in vivo and clinical models.

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**ANTIFUNGAL EFFECT OF DRY AND CASPIAN REGIONS FIG LEAF
EXTRACT ON CANDIDA ALBICANS YEAST**

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Ficus carica generally known as "fig" and is a kind of berry (Moraceae). Different parts of the plant such as bark, leaves, tender roots, fruits, seeds and juice are important in medicine [1]. According to recent studies, important compounds of fig (Ficin, Ficusidin, Bergapten, α -tocopherol, rutin, and stigmasterol) show it as an antimicrobial and antifungal plant [1, 2]. The purpose of this study was evaluation of antifungal effects of methanol, ethanol, acetone and aqueous extracts of both Caspian and dry regions *Ficus carica* leaves on *Candida albicans* yeast in comparison to nystatin antifungal drugs in the lab. After preparing different kinds of fig leaf extracts using Soxhlet, laboratory Microdilution Method (cell counting) was used to determine their antifungal effects. In this method, the solvents used for determination of fungi growth rate in different concentrations of fig leaf extract solutions, were dimethyl Sulfoxide for Methanol extract, Tween for acetone extract, and distilled water for ethanol and aqueous extracts. The results of cell counting showed that the different kinds of fig leaf extracts have antifungal effect on *Candida albicans*. The experiments on standard strain 5027PTCC of *Candida albicans* yeast by using Microdilution showed that various fig leaves extracts containing methanol, ethanol, acetone and aqueous had anti-*Candida* effects. In addition acetone extract of dry region and aqueous extract of Caspian region had the most effect. According to increasing resistance of fungi to routine antibiotics, finding a new antifungal compound is one of the preferences of researchers. As regards herbal medicines have less symptoms and costs they can be one of the sources of antifungal drugs. The result of this research shows that with further study on antifungal effect of fig leaf and other parts of figs can be hoped to produce antimicrobial products in pharmaceutical and food industries.



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**STUDY EFFECTS OF METHANOL EXTRACTS OF FOUR IRANIAN
THYMUS CULTIVARS ON PROLIFERATION OF HUMAN
LYMPHOCYTES**

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The medicinal plant of Thymus (labiateae family) has been used widely in Iranian traditional medicine as antiseptic, anti inflammatory, antioxidant and immunomodulating [1, 2]. The present study was carried out to investigate effect of leaf, stem, root and flower extracts of four Thymus species on lymphocyte proliferation. The Thymus species studied were included *Th. dainensis*, *Th. kotchyanus*, *Th. lancifolius* and *Th. Carmanicus*. The lymphocyte proliferation was measured by MTT assay at different concentrations (2.5, 25, 50, 200, 400 µg/ml). The methanol extract of root, shoot, leave and flower from these four species significantly enhanced frequency and cell number of peripheral lymphocyte cells. The methanol extracts of stem and roots of these four species exhibited potent stimulation of T cell proliferation compared to leave and flower extracts. This study revealed that root and shoot may have a great potential to increase proliferation of lymphocyte cells. This result can be helpful for treatment of some disease such as human immunodeficiency disease and blood disorders.

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EFFECT OF ASCORBIC ACID FOLIAR APPLICATION ON GROWTH AND ANTIOXIDANTS ENZYMES ACTIVITY OF BASIL (*OCIMUM BASILICUM*) UNDER DIFFERENT SOIL MOISTURE LEVELS

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To study the effect of drought stress and foliar application of ascorbic acid on the growth and activity of antioxidant enzymes of basil, a pot experiment was conducted using a factorial based on completely randomized design with three replications. The treatments were ascorbic acid foliar application at four levels (0, 50, 100 and 200 mg/l) and irrigation at three levels (50, 70 and 90% of field capacity). The results showed that by reducing soil water content, plant height, stem diameter, number of leaves, fresh and dry weight of shoot decreased but the root to shoot dry weight ratio and catalase, ascorbate peroxidase and guaiacol peroxidase enzymes activity increased. In addition foliar application of ascorbic acid increased growth parameters and reduced root to shoot dry weight ratio and antioxidant enzyme activity. Ascorbic acid reduced the harsh influences of water deficit. It seemed that Ascorbic acid was able to enhance the tolerance ability of the plant to water deficit stress.

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**THE EFFECT OF DROUGHT STRESS ON MORPHOLOGIC
CHARACTERISTICS, PROLINE AND SOLUBLE SUGARS OF ANISUM
(*PIMPINELLA ANISUM* L.)**

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In order to investigate effect of drought stress on morphologic characteristics, proline and soluble sugars of Anisum an experiment was conducted in alborz karaj stations in 2011. This research was cared out as a randomized complete block design with 4 replications. Main factors were 3 populations of the Anisum (sabzevar, kerman and Jiroft) and sub factors include 4 levels of drought stress (10, 30, 50 and 70 % water depletion). Effect of interaction between main and sub factors were different significant on number of umbels at %1 level and soluble sugars at %5 level. Mean comparison of main and sub factors showed that highest plant height and number of umbels order 50.25 cm and 92.25 n/p belong to kerman population in 10% water depletion and highest proline (1.866%) and soluble sugars (2.953%) belong to Jiroft population in 70% water depletion [1, 2].

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STUDY OF STEM ANATOMY IN GENERE OF MALVA AND ALTHEAE
(MALVATHEA)

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The present research studies the internal structure of the stem cross section in four species of *Altheae* and *Malva* from Malvaceae–in Khorasan Razavi province. Both species have unique characteristics in therapeutic terms. *M. sylvestris* is usually used as a sedative, easing skin rash and removal of rash in most body parts. *M. neglecta* on the other hand, is used in curing coughs and chest pains. The *A. officinalis*, as all parts of the plant have large amount of mucilage, is used in treating chest illness, cough and curing conjunctivitis. The leave is rich with mucilage and is used in external application as well as in removing kidney stone, helping in urination, removing tenesmus; angina. *A. cannabina* too has similar treatment characteristics; though with weaker effects. The internal structures of the stems have been compared under optic microscope by preparing cross sections from the stem, staining with carmn, methyl green. The results showed that the expansion of angular collenchyma differed in the specimens. The cells and extraction cavities are more and larger in *M. neglecta*. In *M. neglecta*, endoderm was noticed on top of supporting tissues on phloem. In *A. cannabina* on the other hand, the supporting tissues cells on the phloem are almost continuous fiber types with penetration into the xylem. With respect to the morphological differences of the two species, the internal structures (of both species) are protected.

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A NOVEL APPROACH TO APPLICATION OF WEEDS AS MEDICINAL PLANT

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Today, weeds are known as unwanted section in agricultural ecosystems. But, it seems that, weeds could have a beneficial role in health, drug, and food industries. The present study investigated the kind, amount, and structure of the molecules of the alkaloid that constitutes the effective substances in 13 weed species included *Atropa belladonna* L., *Datura stramonium* L., *Hyoscyamus niger* L., *Chellidonium majus* L., *Peganum harmala* L., *Cynoglossum officinal* L., *Consolida persica* L., *Aconitum napellus* L., *Papar piptostigmala* L., *Paper rhoeas* L., *Solanum nigrum* L., *Colchicum autumnale* L. were the studied weeds. In the first part of the research, shoot and root were gathered. Then the alkaloid effective substances were extracted by soxhlet apparatus, HPLC, GC and GC/MS. Results showed that, the accumulation of alkaloid effective substances are often high in the root in comparison with other plant parts. The highest amount of alkaloid can be found in root of *Atropa belladonna* L. and seed of *papaver piptostigma* and leaf of *Consolida persica*.



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**INFLUENCE OF ETHANOLIC EXTRACT OF *MELIA AZEDARACH* L.
ON PERCENTAGE OF *ENCARSIA FORMOSA* EMERGENCE FROM
THE PARASITIZED PUPARIUM OF *TRIALEURODES
VAPORARIORUM***

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Trialeurodes vaporariorum (westwood) is one of the main pests of greenhouse plants and vegetables [2]. In addition to environmental problems; using chemical pesticides cause resistance in this pest. Nowadays using botanical insecticides become prevalent and the use of biological control agents in pest's control plays an important role in producing healthy and organic products [3]. *Encarsia formosa* is one of the major agents of controlling *T. vaporariorum* that parasitized various stages of its nymphs [1]. Surveying side effects of botanical pesticides on beneficial insects is one of the requirements of a successful controlling plan that is based on natural materials. In this research, the effects of ethanolic extract of *Melia azedarach* on percentage of *E. formosa* emergence were determined on two whitefly hosts. In the laboratory condition, some parts of the pest host's leaf (beans and tobacco) that have parasitized puparium were placed on the agar gel (0.7%) and each leaf was sprayed with plant derived chemical (at 80 mg/ml). Ethanol (96%) was used in the control treatments. The results of this research demonstrated that plant extract and also host plant did not have any significant effect on the population of emerged *E. formosa*. There is no significant difference between control and treatment in the tobacco and bean's data. In conclusion; this research shows that this plant derived chemical is a safe agent for this natural enemy.

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**TOXICITY OF ESSENTIAL OILS FROM *LAVABDULA ANGUSTIFOLIA*
AND *CINNAMOMUM ZEYLANICUM* AGAINST *AGONESCENA*
PISTACIAE IN LABORATORY CONDITIONS**

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The environmental and health problems caused by extensive use of synthetic pesticides have been the matter of concern in recent years. Essential oils from plants are considered as safe alternatives to conventional insecticides. These compounds show a broad spectrum of activity against insects, acari and fungi [1]. Therefore, this study was conducted to determine the fumigant toxicity of essential oils from *L. angustifolia* and *C. zeylanicum* against 5th nymphal instar of *A. pistaciae* under laboratory conditions. The essential oils were extracted from leaves dried powder using a Clevenger type apparatus. The bioassays were carried out in three replicates and mortalities were recorded 24 h after treatment. Bioassay with essential oil extracted from *C. zeylanicum* showed the LC₅₀ value and its confidence limit were 14.33 (9.66-18.33) µl/l air. Also, toxicity test of *L. angustifolia* essential oil revealed that LC₅₀ and its confidence limit were 16.16 (10.66-20.5) µl/l air. The LC₅₀ value of both essential oils on *A. pistaciae* did not show any significant difference and the dose-response lines of both essential oils are parallel. Essential oils derived from plants are active against insect pests and showed inhibitory effect on insect reproduction [2]. Our results show the potentials of these essential oils for controlling of *A. pistaciae*.

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**TOXICITY OF ESSENTIAL OILS FROM *EUCALYPTUS GLOBULUS*
AND *ROSEMARINUS OFFICINALIS* ON *AGONESCENA PISTACIAE* IN
LABORATORY CONDITIONS**

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One of the most serious problems in agricultural pest management and public health is the phenomena of resistance which is created by long-time exposure with pesticides. Therefore, regarding the high potential of *Agonoscena pistaciae* for resistance to pesticides, the fumigant toxicity of *E. globulus* and *R. officinalis* essential oils were tested against *A. pistaciae* in laboratory conditions. The essential oils were extracted from dried powder plants using a Clevenger type apparatus. The bioassays were carried out in three replicates. The bioassay with different doses of (16.66, 33.33, 66.66 and 100 µl/l air) *E. globulus* showed that the LC₅₀ values and their confidence intervals were 88.66 (59.66-179) µl/l air. Also toxicity test of essential oil from *R. officinalis* revealed that the LC₅₀ and their confidence intervals were as 65 (42.66-159.66) µl/l air. Comparing the relative potency with POLO-PC software [1] showed any significant difference between the insecticidal effects of both essential oils on *A. pistaciae*. Plant essential oils as pesticides may present relatively low-cost active ingredients. In addition, the use of natural products as safe product provides an attractive solution for pesticide residue in crop and environmental [2]. Therefore, the obtained results show the potentials of these essential oils on controlling of *A. pistaciae*.

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EVALUATION OF YIELD AND ITS COMPONENTS IN
INTERCROPPING OF FENNEL (*FOENICULUM VULGARE* MILL.) AND
FENUGREEK (*TRIGONELLA FOENUM-GRÆCUM* L.)

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Intercropping is claimed to be one of the most significant cropping techniques in sustainable agriculture, and much research and many reviews attribute to its utilization a number of environmental benefits, from promoting land biodiversity to diversifying agricultural outcome [1]. In order to evaluate the performance of fennel and Fenugreek grown as pure stands and intercrops, a field experiment was conducted at College of Agriculture, University of Zanzan in the spring of 2012. The experiment was conducted as a complete randomized block design with three replications. Treatments included different combination of Fennel and Fenugreek additive intercropping (A: sole crop of Fennel, B: sole crop of Fenugreek, C, D and E: an additive series %33, %66 and %100 of Fenugreek mixed with %100 of Fennel). Results showed that most traits were significantly ($p \leq 0.05$) affected by planting pattern. So the highest grain yield of Fennel (1420 kg ha^{-1}) was obtained in C treatment (%33 of Fenugreek mixed with %100 of Fennel) and the lowest grain yield was obtained in E treatment (%100 of Fenugreek mixed with %100 of Fennel). Results also showed that the highest grain yield of Fenugreek (618 kg ha^{-1}) was obtained in pure stand of Fenugreek and the lowest grain yield was obtained in C treatment. In all intercropping treatments, land equivalent ratios (LER) were well above 1 indicating yield advantages for intercropping [2].

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**EFFECT OF HALOPRIMING TECHNIQUE ON IMPROVEMENT OF
SOME PHYSIOLOGICAL TRAITS OF MEDICINAL PLANT CAPER
(*CAPPARIS SPINOSA PARVIFLORA* L) SEEDS**

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Caper (*Capparis spinosa parviflora* L) is a winter-deciduous perennial small shrub that grows in hot and dry climates. This is well known as a multipurpose plant which has numerous medicinal properties such as, preventing of cancer, diabetes and etc. Regarding to the germination difficulties the current study investigates the seed germination of caper under potassium nitrate (KNO_3) treatment using the halopriming technique. For this purpose 4X concentration levels (0, 50, 100 and 200 mM) with three replications were considered based on the completely randomized design during 48 hours. Some traits including germination percentage, germination speed, and mean time of germination were measured. Results shows that halopriming technique significantly affected the physiological characteristics of caper seeds in compare to the control treatment at 0.05 levels. The treatment of 200 mM had the greatest rate of germination speed and germination percentage compare to the control respectively with 0.96 seed per day and 44%. The least germination time was observed in the 100 mM with decrease of 0.55 day compared to the control. Results suggest the halopriming technique can be introduced as a new approach to improve germination of this species, particularly in afforestation activities of arid lands in southern Iran.

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**PLASMA MATRIX METALLOPROTEINASE 2, 9 LEVELS ARE
REDUCED FOLLOWING PURSLANE SEED SUPPLEMENTATION IN
PATIENTS WITH TYPE 2 DIABETES MELLITUS**

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Diabetes is a metabolic disorder associated with increased inflammation [1]. Studies have shown that consumption of purslane seed can affect on diabetic patients, however, has not been well defined [2]. Therefore, the present research attempts to study the effect of an eight-week program on levels of Matrix Metalloproteinase 2, 9 and TIMP1 in patients with type 2 diabetes. For that purpose, a total of 20 sedentary women at an average age of 50, suffering from type 2 diabetes, were randomly divided into two groups: control- supplement. Under the supervision of a physician, all the groups used a prescribed dose of metformin. Furthermore, all the groups had a controlled nutrition diet under medical supervision. Complementary purslane seed 7.5 g per day taken with meals including lunch (5 g) and dinner (2.5 g) meals were consumed. For analysis of the variables, blood sampling was carried out before and after the 8-week period each followed by a 12-hour of fasting. For analysis of the findings, t test. Level of significance for all calculations ($p < 0.05$) is considered. After 8 weeks of Matrix Metalloproteinase 2 levels in the supplement group ($t=3.42$ and $p=0.014$) was significantly reduced but no significant changes were observed in the control group ($t=0.422$ and $p=0.668$). The amount of Matrix Metalloproteinase 9 in the supplement group ($t= 4.82$ and $p=0.003$) reduced but there was no significant change in the control group ($t = 1.21$ and $p= 0.27$). TIMP1 levels in the supplement ($t= 2.95$ and $p= 0.026$) and control ($t= 0.835$ and $p= 0.435$) has significantly increased. The research findings can be stated that take purslane seed have a positive impact on Matrix Metalloproteinase 2, 9, TIMP1.

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**EFFECT OF STORAGE TIME OF AQUEOUS SAFFRON EXTRACT ON
SECONDARY METABOLITES**

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Saffron (*Crocus sativus* L), an herbaceous sterile triploid plant, is used mainly as a source of secondary metabolites having aromatic and medicinal value. The major secondary metabolites of saffron are crocin (which is glycoside derivatives of trans-crocetin), picrocrocin, and safranal. In order to study the stability of secondary metabolites of saffron after extraction an experiment was conducted based on completely randomized design with six replications. During flowering period of saffron different samples of stigma were collected and amount of crocin, picrocrocin and safranal was determined using spectrometric method. Aqueous solutions placed in a dark container and measurement of secondary metabolites replicated 6, 11 and 15 days after first measurement. Based on results, 15 days after extraction of saffron metabolites, all of secondary metabolites decreased significantly, but the trend of depression was not similar. The negative trend of crocin was linear and crocin content of samples in 6, 11 and 15 days after first measurement 26, 40 and 58 percent decreased, respectively. Effect of storage time on picrocrocin also was significant and amount of picrocrocin of samples 15 days after first measurement 93 percent decreased. The changing trend of safranal was different and amount of this metabolite increased until 11 days after first measurement and after this time safranal content significantly decreased and reached to 60 percent comparing to first day.

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**EFFECT OF *CINNAMOMUM ZEYLANICUM*, *ALLIUM SATIVUM* AND
URTICA DIOICA ALCOHOLIC EXTRACTS ON ACTIVITY AND
CONTROL OF THE *FUSARIUM OXYSPORUM***

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Medicinal plants are rich stores of secondary metabolites and in fact the vast sources of the active ingredients in pharmaceutical compounds. Protective properties in most of plant extracts against fungi and bacteria are known and used. In recent years due to growing interest for natural materials and increase public knowledge and prevalence of different diseases and various cancers, researchers have paid to the using of essential oils and extracts with more seriousness. This components in addition to antimicrobial properties (antifungal and antibacterial), have also antiparasitic properties, antitoxin production and antioxidation. *Fusarium* species are caused wide range of diseases and damage in extensive extent of plant species. Most of the vascular wilt happened by *Fusarium*, belonging to *Fusarium oxysporum* species. The aim of this study was investigation of antifungal effects of alcoholic extracts of *Cinnamomum zeylanicum*, *Allium sativum* and *Urtica dioica* on *Fusarium oxysporum* which is caused *Fusarium* wilt. Effect of alcoholic extracts of *Cinnamomum zeylanicum*, *Allium sativum* and *Urtica dioica* evaluated against *Fusarium oxysporum* in 0, 25, 50, 100, 500 and 1000 µl/lit concentrations with 4 replications at 27 °C. Sterile water and alcohol were added instead of extract in control. The minimum inhibitory concentration (MIC) and growth inhibition percent were assessed by using medium mixing and then fungicidal and fungistatic of extracts were determined on the PDA medium. These results showed that most of inhibitory of *C. zeylanicum* was density to 100 and 1000 µl, for *A. sativum* was density to 100, 500 and 1000 µl, for *U. dioica* was density to 25, 50 and 100 µl/lit and the extracts had fungistatic.

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**COMPARISON OF THE ANTIOXIDANT ACTIVITY OF THE
FLOWERS METHANOLIC EXTRACT OF TWO PLANTS OF THE
FAMILY (BORAGINACEAE)**

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Cellular damage or oxidative injury arising from free radicals or reactive oxygen species (ROS) now appears the fundamental mechanism underlying a number of human neurodegenerative disorders, diabetes, inflammation, viral infections, autoimmune pathologies and digestive system disorders [1]. In this regard, plant extracts and their constituents as a natural source of antioxidants have been extensively reviewed [2]. *Anchusa sp.* and *Myosotis sp.* are species of flowering plants in the family Boraginaceae [3]. The aim of the present study is to determined amount of total phenolic and flavonoid compounds and also the scavenging activity of DPPH properties of these two plants [4, 5]. *Anchusa sp.* and *Myosotis sp.* flower samples have been gathered from highlands Tonekabon city (Mazandaran province). The amount of total phenolic, flavonoid compound and were performed based on DPPH method, respectively. Results showed that the free radical scavenging were higher for the flower methanolic extracts of *Anchusa sp.* The amount of phenolic compound and also the amount of flavonoid compound of the flowers *Myosotis sp.* was more than other sample.

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**EVALUATE POSTHARVEST *ALOE VERA* GEL-COATING ON
STORAGE LIFE AND QUALITY ATTRIBUTES OF PEACH
(*PRUNUS PERSICACV. ELBERTA*)**

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Aloe vera is a tropical and subtropical plant that has been used for centuries for its medicinal and therapeutic properties [1]. The two major liquid sources of *A. vera* are a yellow latex (exudate) and a clear gel (mucilage), which proceeds from the large leaf parenchymatic cells [2]. *Aloe vera* gel, mainly composed of polysaccharides, has been recently explored as an edible coating owing to its antifungal activity [3]. Edible coatings are used to improve food appearance and conservation due to their environmentally friendly nature, natural biocide activity, incorporation of anti-microbial compounds and creating an atmosphere similar to modified atmosphere packaging [4]. To evaluate the role of *Aloe vera* gel coating on fruit quality of peach (*Prunus persica* cv. Elberta), the uncoated and coated fruit were stored at 0 ± 0.5 C and $90 \pm 5\%$ RH for 15, 30 and 45 days. The experiment was conducted in a completely randomized design with four replications. The results showed that *Aloe vera* gel to reduce the amount and rate of decay compared to control and prevent fruit softening. Peach fruit weight is also reduced in comparison with control samples decreased during storage. Results showed that *Aloe vera* gel can prevent the increase in pH of peach fruit and keep the best level of ascorbic acid in comparison with control. In conclusion, *Aloe vera* gel can be used for extending storage life at ambient or cold storage and maintaining quality of 'Elberta' peach.

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**FRACTION DISTILLATION CHEMICAL COMPOSITION,
ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF THE
ESSENTIAL OIL OF *THYMUS FALLAX* FISCH. MEY**

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Thyme (*T. fallax* Fisch Mey), belonging to the Lamiaceae family, is a pleasant smelling perennial shrub, which grows in several regions of the world such as Western Mediterranean, Southern Italy, Iran, and Turkey. Thyme is used for seasoning, poultry, soups, and vegetables in herbal teas prepared for colds and flues as well. Thyme and its oil have been used as fumigants, antiseptics, antioxidants, and mouth washes. Although antimicrobial and antioxidant activities of essential oil extract of *T. fallax* were investigated in previous studies, there was no research assessing the antibacterial and antifungal activities fractions of essential oil of *T. fallax*. The aim of the present study was to investigate the effect of antibacterial and antifungal activities of Thymol and Crvacrol distilled from the essential oil of *T. fallax* from the Iran flora. *T. fallax* plants were collected from Lar Land, north of Tehran in during flowering season late June 2012. The air-dried and finely ground aerial parts of *T. fallax* were subjected for 3 h to water distillation using a clevenger- type apparatus (Yield 2.6% v/w). The oil was dried over anhydrous sodium sulphate and after filtration subjected to fraction distillation with reduce pressure and separated three fraction of the chemical composition of *T. fallax* essential oil. Analyzed fractions by GC-MS, The components were identified by comparison with their relative retention time and MS (NBS75K library data of the GC-MS system) (Adams, 2001, 2008). Antibacterial and antifungal activities of the essential oils were evaluated against gram-positive and gram-negative bacteria and fungus by disk diffusion method. The microorganisms used were *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella thyphi*, *Klebsiella pneumoniae* and *Candida albicans*. Bacterial strains were cultured overnight at 37°C in Mueller Hinton agar (MHA-Oxoid-CM 337). The yeast was cultured overnight at 30°C in Sabouradud dextrose agar (Oxoid-CM41). thymol (85.9%) was the major component in first fraction .

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COMPARISON OF SALINITY EFFECTS OF ESSENTIAL OIL YIELD
AND COMPONENTS OF *ACHILLEA MILLEFOLIUM* L. IN
GREENHOUSE AND NATURAL CONDITIONS

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Yarrow (*Achillea millefolium* L.) belongs to the Asteraceae family and has been used in folk medicine against several disturbances including wounds, hemorrhages, headaches, spasmodic diseases, flatulence, dyspepsia and skin inflammations. An experiment was carried out using a completely randomized design in order to study the comparison of salinity effects on *Achillea millefolium* in controlled environment of greenhouse and natural conditions with two treatments and four replications per treatment. Salinity levels included 0 (control) and 150 mM NaCl. Its essential oil was analyzed by GC and GC/MS. The result was showed significantly increase in the essential oil yield at 150 mM NaCl in greenhouse condition. Regarding the essential oil composition, the main compounds were α -Bisabolol (24.4%-17.1%), Delta-cadinol (22.5%-25.5%), β -Sesquiphellandrene (8.5%-7.8%), Borneol (6.6%-2.7%), Germacrene-D (2.5%-1.7%), Menthone (2.5%-1%) in greenhouse and natural conditions, respectively.

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**THE EFFECT OF FE CHELATE APPLICATION ON
ROSA DAMASCENA MILL.**

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Damask rose (*Rosa damascena* Mill.) is a valuable medicinal plant which had been cultivated in Iran for centuries. To evaluate the response of damask rose to Fe chelate, this experiment was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2012. Experimental design was randomized complete block design with three replications. Treatments included 0, 8 and 12 g Fe chelate/plant, applied in soil when flowers started to bloom. Analysis of variance indicated that Fe fertilizer significantly affected plant height, the number of main and lateral stems, length of the lateral stems, total fresh flower weight during the flowering period, the number of flowers during the flowering period and the essential oil percentage. Mean comparison indicated that the highest values of the mentioned traits were achieved in 12 g/plant (7.42 cm, 15.52, 4.32, 27.57 cm, 5347.3 g/plant, 2831.67 and 0.04%, respectively). Results generally showed that applying 12 kg Fe chelate/ha was more effective than the other treatments.



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THE EFFECT OF GROWTH REGULATORS ON
MORPHOPHYSIOLOGY AND AGRONOMIC CHARACTERISTICS OF
PSYLLIUM (*PLANTAGO PSYLLIUM*)

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The effect of application of plant growth regulators on the qualitative and quantitative changes in *Plantago psyllium* yield was evaluated. So, an experiment in a randomized complete block design (RCBD) with 13 treatments and 3 replications was conducted in the Karaj institute of medicinal plants in 1391. Control (soaking the seeds before planting and spraying with distilled water after planting) with GA₃ 25 ppm, GA₃ 50 ppm, NAA 25 ppm and NAA 50 ppm treatments were applied soaking the seeds before planting and spraying after planting. Plant height, main stem diameter in crown area, number of spike per plant, number of leaf per plant, thousand seed weight, harvest index and leaf chlorophyll content were measured. The results of ANOVA indicated that application of plant growth regulators on the stem diameter, number of leaf per plant, leaf chlorophyll content and thousand seed weight were significant at the 5% level. The Plant height and harvest index traits were significant at the 1% level. The number of spike per plant was not significant. Mean comparisons showed that the highest Plant height were recorded in GA₃ 25 ppm (spraying after planting) and GA₃ 25 ppm (soaking seed before planting and spraying after planting). The highest crown diameter was observed in NAA 50 ppm (soaking seed before planting and spraying after planting). The highest number of leaf per plant and number of spike per plant were recorded in GA₃ 25 ppm (soaking the seed before planting). The maximum amount of leaf chlorophyll were observed in GA₃ 50 ppm (soaking seed before planting and spraying after planting) and NAA 25 ppm (spraying after planting). The maximum amount of thousand seed weight was recorded in GA₃ 50 ppm (soaking the seed before planting). The highest harvest index was recorded in NAA 50 ppm (soaking seed before planting).

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COMPARATIVE STUDY OF THE *HELICOBACTER PYLORI* ACTIVITY AND ESSENTIAL OILS COMPONENTS OF *THYMUS KOTSCHYANUS* BOISS. & HOHEN AND *THYMUS PUBESCENS* BOISS. KOTSCHY EX CELAK FROM IRAN

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Thymus species are commonly used as tonic, carminative, digestive, antitussive, expectorant and for the treatment of cold in Iranian traditional medicine. Recent studies imply that these species have strong antibacterial activities the aerial parts of Thymus Kotschyanus Boiss. & Hohen and T. pubescens Boiss. & Kotschy ex Celak (syn. T. xylorrhizus Boiss. & Kotschy) (Lamiaceae) were collected from the Lar mountainside (North of Tehran, Iran) in May 2012. Essential oils isolated by steam distillation from the aerial parts of T. Kotschyanus and T. pubescens after full flowering stage, were analyzed by GC/MS. Among the 35 and 37 compounds identified, the major components were carvacrol (65.3% and 48.8%), thymol (12.4% and 18.7%), γ -terpinene (7.3% and 2.3%) and p-cymene (2.2% and 14.5%) for T. Kotschyanus and T. pubescens, respectively. Antibacterial activity of the Essential Oils was investigated against Helicobacter pylori (the bacteria responsible for stomach inflammation). T. pubescens seems to be a good candidate for control Helicobacter pylori.

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**EFFECT OF CULTURE FILTRATE OF *FUSARIUM GRAMINEARUM*
ON TOTAL PHENOL AND FLAVONOL CONTENT IN CELL
CULTURE OF *LINUM ALBUM***

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Linum album Kotschy ex Boiss., one of endemic species in Iran, produces valuable metabolites. These metabolites which occur in a few plant species and have pharmacological significance for its anticancer activities. Manipulation of cell culture media by elicitors is one of the important strategies for inducing secondary metabolites. Fungal elicitors can effect on the plant defense system and increase secondary metabolites including phenolic compounds. In this study, first we filtered culture of *F. graminearum* by using 0.4 μ m filter and after 7 days of pre-culture, the cells were treated with 1 % (v/v) of culture filtrate. Measurement of total phenol was performed by Ranganna (1986) method and flavonol by Akkol and Goger method (2008). The results showed that culture filtrate of *F. graminearum* significantly increase of phenolic compound in *L. album* cells at 5 day after treatment.

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**EFFECT OF ORGANIC MATTER, IRON AND ZINC ON *CUMIN*
CYMINUM PRODUCTION IN CALCAREOUS SOILS**

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In order to study the effect of different of organic matter iron and zinc fertilizers on yield and yield components of *Cumin cyminum* in Jiroft area .Two organic matter Levels (0-15 ton dried manure /ha) and three Fe Levels (0-2/5-and 5 kg Sequestrine /ha) and three Zn Levels (0-25-and 40 kg znso4/ha) in a completely randomized block design with three replications in the study ,Plant responses were in cludyin, shoot dry weight, height, number of seeds per plant, the number of umbrellas, grain weight plant height and grain weight were significant at 1% fertilizer levels on dry weight of the shoot the number of seeds per plant umbrella plant, height of plant and essential oil content was significant at the 1% level also interaction organic matter and fertilizer on shoot dry weight - performance - number of seeds per plant and seed weight and height at 1% and 5% percent according to the statistical results can be used to increase the maximum yield components of cumin treatment record combined, 15 tons of manure per hectare, 25 kg zinc sulphate per hectare and, 5 kilograms of Sequestrine iron fertilizer per hectare is recommended.



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**EFFECT OF NaCl SALINITY AND ASCORBIC ACID ON BIOMASS
YIELD AND ESSENTIAL OIL CONTENT OF
PELARGONIUM GRAVEOLENS L.**

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Geranium (*Pelargonium graveolens* L.) is a highly aromatic plant. Its' essential oil with strong rose-like odor is a major ingredient in perfumery and aromatherapy [1, 2]. In order to study the effect of NaCl salinity and ascorbic acid on herb yield, essential oil content and yield of this plant, a greenhouse experiment with pot geranium plants was carried out in Lorestan University, Iran, in 2012. Four concentrations of NaCl (0, 40, 80 and 120 mM) and three concentrations of ascorbic acid (0, 100 and 200 mM) were combined factorially based on a completely randomized design with four replications. Plants were treated with NaCl through irrigation twice a week and sprayed weekly with ascorbic acid. Results showed that salinity decreased biomass production and oil yield. Application of ascorbic acid not only reduced the negative effects of salinity but also increased biomass production and oil yield in control plants (0 mM NaCl). Changes in oil yield were due to changes in biomass yield, as oil content was not affected by NaCl salinity and/or ascorbic acid. The highest oil yield was found in control plants treated with 100-200 mM ascorbic acid. The lowest oil yield was found in plants treated with 120 mM NaCl and 0 mM ascorbic acid.

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**EVALUATION OF RADIATION USE EFFICIENCY AND EXTINCTION
COEFFICIENT IN SUMMER PUMPKIN (*CUCURBITA PEPO* L.)**

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The purpose of this study was to obtain baseline values for extinction coefficient (K), radiation use efficiency (RUE, g MJ^{-1}) of summer pumpkin crops grown under well-watered conditions. The stability of these parameters during the crop life cycle and under different environmental and growth conditions created by season and sowing date and distance between rows, were evaluated. Field experiment, with three sowing dates (20 Apr., 21 May and 21 Jun.) and three the distance between rows (1, 1.5 and 2 m), were conducted during two years 2010 and 2011. Crop leaf area index, light interception, and crop biomass were measured between emergence and maturity [1]. K declined with an increase in solar elevation and plant density. Average K and RUE respectively 0.73 and 1.5 g MJ^{-1} were obtained. RUE was constant during the whole crop cycle.

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**EVALUATION THE ALLELOPATHIC EFFECT OF SHOOT AQUATIC
EXTRACT OF BERMUDAGRASS (*CYNODONDACTYLON*) ON
GERMINATION AND SEEDLING GROWTH OF FENNEL
(*FOENICULUMVULGARE*)**

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In order to study the allelopathic effect of different shoot aquatic extract of bermudagrass (*Cynodondactylon*) on fennel seed germination and growth characteristics, a laboratory experiments were conducted on Agricultural Faculty of Shahid Chamran University of Ahvaz in 2012. The experimental design was completely randomized, with three replications. The treatments was including different extract of bermudagrass shoot extract concentration in four levels including distilled water (control), 25% w/v, 50% w/v ,75% w/v and 100%. The germination percent, seed germination rate, radicle and plumule length, seed vigor index, radicle to plumule ratio and radicle and plumule dry weight of fennel were measured. The results showed that the effects of different bermudagrass aquatic extract concentration had significant effect on germination percent and speed, radicle and plumule length and vigour index. The highest and the lowest germination rate (90 and 8.3% respectively), germination speed (6.9 and 0.34 seed/ day respectively) and seed vigour of fennel were obtained at control and 100% extract concentration of bermudagrass respectively. The highest plumule and radicle were obtained at 25 and 50% of extract concentration respectively. Although that differences was not significant with control treatment. The bermudagrass extract concentration had not significant effect on radicle/plumule length ratio. So, the final result showed that the bermudagrass aquatic extract had significant effect on fennel germination and seedling growth characteristic [1, 2].

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**EFFECT OF ASCORBIC ACID ON VEGETATIVE CHARACTERISTICS
OF *PELARGONIUM GRAVEOLENS* L. UNDER NaCl SALINITY**

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Salinity is a major factor reducing growth and crop productivity [1]. Geranium (*Pelargonium graveolens* L.) oil is extensively used in perfumery, aromatherapy, cosmetics, food and pharmaceutical industries [2]. In order to study the effect of NaCl salinity and ascorbic acid on growth characters of this plant, a greenhouse experiment with pot geranium plants was carried out in Lorestan University, Iran, in 2012. Four concentrations of NaCl (0, 40, 80 and 120 mM) and three concentrations of ascorbic acid (0, 100 and 200 mM) were combined factorially based on a completely randomized design with four replications. Plants were treated with NaCl through irrigation twice a week and sprayed weekly with ascorbic acid. Results showed that as salinity level increased growth characters i.e. plant height, stem diameter, number of leaves, leaf area, fresh and dry weight of leaves, stems and roots decreased. Application of ascorbic acid could reduce the negative effects of salinity on the measured characters. Therefore, application of 100 mM ascorbic acid could be recommended to induce NaCl-salinity tolerance in geranium.

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**PROTECTIVE EFFECTS OF *PORTULACA OLERACEA* L. AGAINST
CARBON TETRACHLORIDE-INDUCED HEPATOTOXICITY IN RATS**

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Portulaca oleracea L. (purslane, Portulacaceae) is a widely distributed weed. It has been used as a folk medicine in many countries as a diuretic, febrifuge, antiseptic, antispasmodic and vermifuge. It exhibits a wide range of pharmacological effects, including antibacterial, analgesic, anti-inflammatory, skeletal muscle relaxant and wound-healing activities [1, 2]. It is also consumed as a vegetable and has been reported to be rich b-carotene, a-linolenic acid [3]. In addition to flavonoids, coumarins and a monoterpene glycoside, alkaloids have also been reported to be important chemical constituents of this plant. We investigated the protective effects of purslane ethanolic extract against carbon tetrachloride (CCl₄)-induced liver damage in rats. Ethanolic extract of purslane (5, 10, 50, 100, 150 mg/kg b.w.) were administered for 28 consecutive days to CCl₄-induced rats. The hepatoprotective activity was assessed using various biochemical parameters such as aspartate transaminase (AST), alanine transaminase (ALT) and alkaline phosphatase (ALP) enzymes. Our result showed that administration of purslane significantly lowered serum AST, ALT and ALP levels in CCl₄-treated rats. So, this study is suggested that purslane exerts hepatoprotection via promoting antioxidative properties against CCl₄-induced oxidative liver damage.

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THE STUDY OF ANTIBACTERIAL EFFECTS OF *LAWSONIA INERMIS*, *ZATARIA MULTIFLORA BOISS* AND *URTICA DIOICA* ALCOHOLIC EXTRACTS ON *PSEUDOMONAS SYRINGAE*

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Plant extracts are the most widespread and safest natural compounds that used in the control of postharvest disease. Recently, researchers believe that extracts and essential oils of plants can be effective in controlling diseases caused by pathogenic bacteria. Pathogenic plant bacteria are the main factors reducing the production of horticultural products. One of an important of these bacteria is *Pseudomonas syringae*, which is contaminating apricot and garden plants. This study investigated antibacterial effects of alcoholic extracts of *Lawsonia inermis*, *Zataria multiflora Boiss* and *Urtica dioica* on *Pseudomonas syringae*, pathogenic bacteria reaction to difference plant extracts, determine the appropriate concentration of plant extracts in control bacteria activity and agricultural development of healthy, sustainable and organic. The antibacterial effect of *Lawsonia inermis*, *Zataria multiflora Boiss* and *Urtica dioica* extracts were evaluated by well diffusion method. In order to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentrations (MBC) from different concentrations of extracts, *Lawsonia inermis* (0/33 up to 85 mg ml⁻¹), *Zataria multiflora* (0/29 up to 150 mg ml⁻¹) and *Urtica dioica* (0/42 up to 110 mg ml⁻¹), broth dilution method was used. These results showed that the bacterial growth inhibition zones in the presence of *Lawsonia inermis*, *Zataria multiflora* and *Urtica dioica* extracts were 13, 14 and 12 mm, respectively. MIC and MBC of *Lawsonia inermis* extract were obtained 1.32 and 2.65 (mg ml⁻¹), for *Zataria multiflora* extract were 2/34 and 4/68 (mg ml⁻¹) and for *Urtica dioica* extract were 1.71 and 3.43 (mg ml⁻¹) respectively. *Lawsonia inermis* extract showed better antibacterial effects than to *Zataria multiflora* and *Urtica dioica*. Thus appropriate concentrations of its can be used as a treatment for garden plants diseases that caused by plant pathogenic bacteria "*Pseudomonas syringae*" [1-3].

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**PURSLANE EXTRACT AMELIORATES CARBON TETRACHLORIDE-
INDUCED ACUTE HEPATIC INJURY IN RATS**

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Portulaca oleracea has been used for treating dysentery with bloody stools, and externally for sores, eczema, erysipelas, snake- and insect-bite. Furthermore, purslane has also been used as folk medicine in other countries treating various human ailments. It is used as an antiseptic, anti-scorbutic, antispasmodic, diuretic, vermifuge, in oral ulcers and in urinary disorders [1, 2]. We investigated the protective effects of purslane ethanolic extract against carbon tetrachloride (CCl₄)-induced liver damage in rats. Ethanolic extract of purslane (5, 10, 50, 100, 150 mg/kg b.w.) were administered for 28 consecutive days to CCl₄-induced rats. Histopathological examination of livers showed that purslane reduced fatty degeneration, cytoplasmic vacuolization and necrosis in CCl₄-treated rats. The CCl₄-induced histopathological changes were also reduced by the purslane pretreatment. The results suggest that purslane extract exhibits potent hepatoprotective effects on CCl₄-induced liver damage in rats.

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APPLICATION OF PLANT GROWTH REGULATORS ON
MORPHOPHYSIOLOGICAL AND AGRONOMICAL PROPERTIES OF
FENUGREEK (*TRIGONELLA FOENUM-GRÆCUM* L.)

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In order to investigate the effect of application of plant growth regulators on qualitative and quantitative changes in performance of fenugreek (*Trigonella foenum-graecum* L.). An experiment was conducted on randomized complete blocks design (RCBD) with 13 treatments and 3 replications in 2012 at the research greenhouse in Institute of Medicinal Plants (IMP), ACECR. The treatments were consist of control (soaking the seeds before planting and after planting sprayed with distilled water), GA₃ 25 and 50 ppm, NAA 25 and 50 ppm (soaking the seeds before planting, spray after planting, soaking seeds before planting with spray after planting). Measurements were plant height, stem diameter at crown, and stem dry weight per plant, leaf dry weight per plant, number of leaves per plant, dry weight of pods per plant, chlorophyll content of leaves plant, trigonellin content of seed per plant. Analysis of variance indicated that the application of plant growth regulators on plant height, stem dry weight per plant, leaf dry weight per plant, dry weight of pods per plant, seed per plant trigonellin were significantly difference at $P \leq 0.01$ and stem diameter at crown, number of leaf per plant were significantly difference at $P \leq 0.05$. Application of plant growth regulators had no significant effect on the amount of chlorophyll. Mean comparisons showed that the highest plant height, stem diameter at crown, stem dry weight per plant is in NAA 50 ppm (soaking seeds before planting and spray after planting), and also were obtained the highest leaf dry weight per plant and number of leaf per plant in GA₃ 50 ppm (spray after planting), the highest dry weight of pods per plant in GA₃ 25 ppm (spray after planting), and highest amount of trigonellin in GA₃ 50 ppm (soaking the seeds before planting , spray after planting).

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**EFFECT OF PLANT GROWTH REGULATORS AND MEDIA ON
MICROPROPAGATION OF *ARTEMISIA AUCHERI* BOISS.**

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Artemisia aucheri Boiss is a medicinal plant with disinfectant, antiparasitic, astringent properties that has been grown in steppe or semi steppe regions of Iran. This paper describe in vitro organogeneses of Dermaneh kohi by using nodal explants that isolated from 90 days grown seedling. The explants were cultured on Murashige skoog and Driver kuniyuki media with different concentrations of BA (0,0.1,0.3 mg/l), NAA (0,0.2,0.5 mg/l) and GA₃ (0,2,4 mg/l). After 60 days maximum number of shoots (32 in per explants) was obtained on murashige skoog supplement 0.3 mg/l BA, 0.2 mg/l NAA, 4 mg/l GA₃. The highest number of roots (5.33 in per explants) was produced on murashige skoog supplement 0.5 mg/l NAA. On Driver kuniyuki medium supplement 0.3mg/l BA and 0.5 mg/l NAA was produced maximum number of shoots (16.5 in per explants) and the highest number of roots (2 in per explant) was obtained with 0.2 mg/l NAA. Our result showed the murashige skoog medium is the better for organogeneses dermaneh kohi than the Driver kuniyuki.

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**INVESTIGATION OF ROW ARRANGEMENT AND PLANTING DATE
ON QUALITY AND QUANTITY OF *CUCURBITA PEPO* L.**

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Pumpkin (*Cucurbita pepo* L.) is one of the important medicinal plants. The objective of this study was investigation effect of planting date and row arrangement on quality and quantity traits of *Cucurbita pepo*. This study was done in split plot on complete randomized design with 3 replications at Research Field of Aburaihan College, University of Tehran in (two years) 2010 and 2011. Treatments were included 3 main plots of planting dates (20 Apr, 21 May and 21 June) and 3 sub plots of row arrangement (1, 1.5 and 2 meter between two row). In this study were evaluated weight of 1000 seed, seed number in fruit, seeds weight in fruit, fruit yield, seed produce index, oil percentage and oil yield and year factor had significant effect on oil percentage and seed number in fruit. The interaction of planting date×row arrangement, in all quality and quantity treatments, were significant and 1 meter row spacing in 21 May and 1.5 meter in 21 June produced the most seed yield, oil percentage and oil yield. Knowledge of density and date planting could help increasing vegetative growth and then increase economic yield of this plant. Consequently the results of this experiment showed that row arrangement and planting date influenced on seeds weight in fruit, seed yield and oil yield.

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VIRUS INDUCED GENE SILENCING IN *CANNABIS SATIVA*

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Studying gene function through direct genetic strategies was mostly dependant on mutant plants that somehow were lacking a cellular function. This method had disadvantages such as limitation in choosing the genes that would be studied and difficulties in obtaining the desired mutants especially in non-model plants [1-3]. In genome era with the sudden increase in released data on gene sequences of many different organisms, the reverse genetic strategies have become more important. One of the increasingly popular reverse genetic methods is virus induced gene silencing (VIGS) that benefits from plant's own defense mechanism against viral infections (RNAi) and is very specialized [4]. Therefore, in this study we applied VIGS method on *Cannabis sativa* to silence phytoene desaturase (*pds*) gene using syringe-infiltration of tobacco rattle virus (TRV)-vector into one, two and three week old cannabis plantlets. Infiltrated plants were kept in a controlled growth chamber at 21°C under 16/8 hrs day/night. 10 days post inoculation, three week old cannabis plantlets exhibited photobleaching which represents successful functional silencing of *pds* gene by VIGS method.

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**CHEMICAL COMPOSITIN COMPARING, OF ESSANTIAL OILS OF
HERACLEUM PERSICUM L. SEEDS IN CONDITIONS OF DEHBALA
AND MANSHAD AREAS OF YAZD PROVINCE**

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Golpar is the Persian common name for *Heracleum* species belonging to the family of Umbelliferae. The genus of *Heracleum* consists of 10 species which are found wild or cultivated in many mountainous regions of Iran, four of which are endemic. One of the more important of these species is *Heracleum persicum* L. [1]. The fruits of *Heracleum Persicum* are widely used as species and the young stems are also used for making pickles and in Iranian folk medicine [2]. The Volatile chemical constituents of the essential oil of *Heracleum Persicum* seeds, that is growing wild in Dehbala and Manshad habitats Yazd were analyzed by GC and GC/MS technique. 29 compounds in Manshad and 34 compounds in Dehbala, The main components were detected in Dehbala: Hexylbutanoate 21.93%, n-octyl acetate 25.88%, Hexyl-2-methyl butyrate 5.96%, octyl butyrate 4.44%, n-octyl-2-methyl-butyrate 5.79%. The main components were detected in Manshad: Hexylbutanoate 23.75%, n-octyl acetate 34.33%, Hexyl-2-methyl butyrate 5.34%, octyl butyrate 2.74%, n-octyl-2-methyl- butyrate 3.17%.

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**INTRODUCING THE BEST METHOD FOR DNA EXTRACTION AND
COMPARING IT WITH COMMON METHODS IN MEDICINAL PLANT
OF NORUZAK (*SALVIA LERIIFOLIA*)**

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Noruzak (*Salvia leriifolia*) is a perennial plant from Lamiaceae family, which is grown in Khorasan and Semnan provinces of Iran. The existence about 56 percent oil in kernel, essence and secondary metabolites in root and shoot and qualitative forage make it suitable as a potential of oil seed, medicinal and forage crop. In the entire world, noruzak exists only in Iran and some parts of Afghanistan, and up to now has not done enough research on this valuable plant. Because of DNA extraction is base of genetic research, we decided to found the best method for DNA extraction in noruzak. In order to achieve this goal, we examined the methods that offered by researchers, who had studied DNA extraction from plants with high levels of polyphenols and polysaccharides. In this present study, all of the methods are based on CTAB protocol and added some changes to them, including: in the method 1: use of 2% activated charcoal, in the method 2: using 250 µl of 5 M potassium acetate, in the method 3: consuming 150 µl of 7.5 M ammonium acetate, in the method 4: use of 300 µl of 7.5 M ammonium acetate and in the method 5: using 5 M sodium chloride in 4 steps. The nanodrop results show DNA concentration in the methods 1 to 5 is 165.5, 922.2, 1590, 301.3 and 516.2 nanograms per microlitre, A260/280 ratio is 2.08, 1.6, 1.74, 2.06 and 2.13 and A260/230 ratio is 1.41, 1.08, 1.13, 1.71 and 2.18, respectively. In order to assess quality of extracted DNA, electrophoresis on 1% agarose gel was performed and the results were consistent with the nanodrop results. Therefore, CTAB protocol with using 5 M sodium chloride in 4 steps (method 5), better than other methods could overcome high levels of polyphenols and polysaccharides and produced high quality DNA from noruzak.

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**EFFECT OF GRAPE SEED'S EXTRACT ON SOME SECONDARY
METABOLITES AND FUNGAL DECAY OF TABLE GRAPE
(CV. FAKHRI.) OVER POSTHARVEST LIFE**

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Grape seed's extract is derived from whole grape seeds that have a great concentration of vitamin E, flavonoids, linoleic acid, phenolic compounds containing antioxidant. Post-harvest losses, especially in the attack of fungi, is an important factor in reducing the storage life of fruits and vegetables. The present experiment examined the effects of antifungal compound to maintain qualitative properties of grape. Seed extracts applied in design of factorial framed with completely randomized design using four replications. Treatments were included of the two levels of grape seed extract (0 and 1%) and four stages of applications (0, 15, 30 and 45 days). Grapes were kept in temperature 1°C and 85% relative humidity. Analysis of variance showed the treatments had significant effects on preservation of some secondary metabolites, including anthocyanin, Phenol and titratable acid. Furthermore the extract significantly inhibited fungal infections ($P < 0.01$). Results revealed at the 30 days after storage the highest levels of anthocyanin (0.056 µg per g fresh weight), phenol (549 Mg per g fresh weight) and titratable acid (3.92 Mg per g) obtained through application of 1% seed extract in comparison with control, and 45 days of storage, and 1% were 30 days of storage. Comparison of means indicated the lowest infection rate (3%) gained via application of seed extract (1%) at the stage of 15 and 45 days after storage. According to results of this experiment, addition of grape seed's extract can be useful for increasing in storage life of grape clusters.

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**DETERMINING THE BEST HORMONAL TREATMENT AND MEDIA
FOR PROPAGATION OF *ARTEMISIA SIEBERI* INVITRO**

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Dermaneh dashti (*Artemisia sieberi* Besser) is a perennial plant belonging to Asteraceae family. It has different medicinal properties such as antifungal, antimicrobial and antidiabetic. In this study, in vitro nodal culture of Dermaneh dashti is investigated in Murashig and Skoog and Woody Plant Medium including hormonal treatment with concentrations (0,0.2,0.5 mg/L) of NAA and (0, 2, 4 mg/L) of GA3 and (0, 0.1, 0.3 mg/L) of BA. Two month after explants growth of nodal in MS and WPM medium, number of root and shoot were measured and comparing the averages showed that hormone treatment in MS medium of 0.1 mg/L BA, 0.2 mg/L NAA and 2 mg/L GA3 had maximum regeneration of shoot (24.66 in per explant) while 0.5 mg/L NAA had maximum regeneration of root (2.16 in per explant). Also in WPM medium hormone treatment of 0.3 mg/L BA, 0.5 mg/l NAA and 2 mg/L GA3 had maximum regeneration of shoot (29.5 in per explant) while 0.2 mg/L NAA and 4 mg/L GA3 showed maximum regeneration of root (3.16 in per explant). According to our results the best medim for propagation of Dermaneh dashti was MS.

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**THE EFFECT OF MEDICAGO SATIVA SUPPLEMENTATION ON
SERUM LIPID PROFILE IN LOW WEIGHT GIRLS**

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The research shows that the Lean people are Susceptible to disease over than the others. Use of medicinal plants helps. Then the aim of this study was to examine the effect on intake Medicago sativa for 4 weeks on serum lipid profile in low weight girls. The research sample consisted of 24 girls, average age 15/5 years, height: 157/4 centimeters, body mass 18 were randomly divided into two groups. 1 – Medicago sativa supplementation, 2- control. Subjects take Medicago sativa for 4 weeks (20 g/day). The subjects' blood after 12 hours of fasting between 8 am to 9am done. Blood serum immediately isolated in the laboratory and at a temperature of - 80° C was maintained, after depletion of the lipid profile were measured. Results were analyzed by t test. Significance level of $P \leq 0/05$ was considered. The results showed that the take of Medicago sativa supplementation had significant impact on resting levels of LDL ($p = 0/001$), HDL ($p = 0/022$) TG ($p = 0/000$) CHOL ($p = 0/012$) in low weight girls. The research findings showed that 4 weeks of take of Medicago sativa supplementation improves lipid profile in low weight girls. It is suggested that low weight girls can benefit from additional treatment.

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**MORPHOPHYSIOLOGICAL CHANGES OF FENUGREEK
(*TRIGONELLA FOENUM-GRÆCUM* L.) LEAVES TO FOLIAR
APPLICATION OF METHANOL AND NANO-IRON CHELATED IN
FIELD**

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Fenugreek is an annual Mediterranean and Asiatic medicinal and aromatic herb. In order to determine the effects of methanol and nano-iron chelated spray on morphophysiological traits of fenugreek leaves, two factorial experiments in basic plan of randomized complete blocks design with three replications were conducted during cropping season in 2010 and 2011 year. The first factor was the aqueous solutions of methanol in five levels ($M_0=0$, $M_1=10$, $M_2=20$, $M_3=30$, and $M_4=40\%$ v/v) and the second factor, that is nano-iron chelated application was considered at three levels ($I_0=0$, $I_1=1$, and $I_2=2$ g L⁻¹). Variance analyses showed that the effects of methanol applications on the leaf dry weight, number of leaves per plant, petiole length, and leaf area were statistically significant ($P<0.01$ and $P<0.05$) differences in both and means of years. But, there were no statistically significant differences on SPAD value in both experimental years. Based on results of mean comparisons, the highest and lowest values of leaf dry weight, number of leaves per plant, petiole length, and leaf area in both experimental years were obtained from 40% (v/v) methanol applications and control plots, respectively. Regarding with nano-iron applications, leaf dry weight, number of leaves per plant, petiole length, leaf area, and SPAD value of fenugreek was significantly ($P<0.01$ and $P<0.05$) affected by different concentrations of nano-iron in both and average of years. The highest and lowest amount of leaf dry weight, number of leaves per plant, petiole length, leaf area, and SPAD value in both experimental years were related to 1 g L⁻¹ concentration of nano-iron and control treatment, respectively. Methanol and nano-iron interactions for all leaves traits were not significant in both years. In general, leaves traits were significantly increased with foliar application of methanol and nano-iron chelated.

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EFFECT OF THYMUS ESSENTIAL OIL, SALICYLIC ACID (SA) AND METHYL JASMONATE (MJ) ON STORAGE LIFE AND QUALITY OF REDTABLEGRAPES (CV. SAHEBI).

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One of the modern techniques used to control pests and diseases, especially to produce organic crops is to use natural or growing material and components with microbial and herbaceous origin. The aim of this study was to evaluate the effect of natural components on fungal decay and some quality Attributes of red table grape cultivar (sahebi). The experiment was done by a factorial trial at completely randomized design with four replicates. SA and MJ applied with dipping and thymus vulgaris essential oil was sprayed to grape cluster. The experimental treatments includes four levels of compounds with a fixed concentration (control, thymus vulgaris essential oil, salicylic acid, methyl jasmonate, with concentrations of 5 $\mu\text{L.L}^{-1}$, 2 mM.L^{-1} and 0.2 mM.L^{-1} respectively) and 4 time (0, 15, 30 and 45 days). Grapes were kept in 1°C and 85% relative humidity. Investigated parameters includes anthocyanin, titratable acid, total soluble sugars and fungal infection. Table of Analysis variance showed that amount of anthocyanin was increased significantly between treatments ($P < 0.05$). Also titratable acid and total sugar was increased significantly compare to control group ($P < 0.01$). In this experiment, fungal infection percent has significant decrease compare to control group ($P < 0.01$). Comparison table of means showed that the maximum amount of titratable acid (5.75 mg/g) was observed in methyl jasmonate treatment and 4th time (45 days), and the highest amount of anthocyanin (0.92 mg/g fresh weight) allocated to grapes that was treated by thyme essential oil. Also the highest total sugar (638.28 mg/g fresh weight) was found in methyl jasmonate treatment in 3rd time. Salicylic acid and thyme treatments have lowest Fungal infection compare to control and other group. According to results of this experiment, addition of thyme essential oils and SA can be useful for increasing in storage life of grape clusters.

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**EFFECT OF *TERMINALIA CHEBULA* ON GROWTH PERFORMANC,
SERUM BIOCHEMICAL PARAMETERS AND ORGANS WEIGHT IN
BROILER CHICKENS**

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A recent trend in the meat production industry is to decrease or stop the use of antibiotics, which are used to prevent disease and thereby promote growth in poultry [1]. With the increased concerns over food safety and general health risks, the use of medicinal herb was suggested way to avoid the use of antibiotics [2]. The ripe fruit of *Terminalia chebula* is reputed to improve health and to promote longevity [3]. The objective of this study was to investigate the effect of supplementation *Terminalia chebula* (TC) in replacement of antibiotic on performance, organs weight and serum biochemistry parameters. Three hundred 7-d-old male broilers (Ross 308) were randomly allocated into 5 groups: a control group (corn-soybean meal diet), an antibiotic group which supplemented by flavophospholipol (FL-650 ppm) and groups receiving 0.5, 1.0, or 2.0% dried TC. Body weight and feed intake was measured weekly. At 6 wk of age, 8 birds per treatment were randomly selected and fresh blood was obtained by cardiac puncture and serum separated. Immediately after blood sampling, the birds were slaughtered and some organs were weighed.

The results of broiler performance were shown body weight gain of TC 0.5% was increased significantly than other TC supplementation groups at 21 and 42 days of age; however it was not significantly different from control and FL groups. Supplementation 1 and 2% TC in diet caused suppressing feed intake than other groups in 7-21 and overall experimental periods. However, feed efficiency was not significantly different between groups. Analyses of data revealed no significant difference for carcass yield, breast, thigh percentage and supply organs weight (proventriculus, gizzard, intestine, pancreas, liver and bursa). However, weight of spleen of FL group was significantly higher than others. Profile of biochemical parameters of serum showed that triglyceride, calcium, phosphorus and aspartate aminotransferase was not significantly different. Cholesterol of groups which supplemented by TC was higher than control and FL groups and glucose level of control group was significantly increased than other groups. It can be concluded, that *Terminalia chebula* in level of 0.5% might be used as a phytogetic feed additive in replacement of growth promoter antibiotic.

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**EFFECTS OF DIETARY ADMINISTRATION OF *ALOE VERA* ON
SERUM ANTIOXIDANT ENZYMES IN RAINBOW TROUT
FINGERLINGS**

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This experiment was conducted to examine the effect of dietary *Aloe vera* on serum antioxidant activity in fingerling rainbow trout (9.5 g \pm 0.85). Four experimental diets according to different levels of supplemented *Aloe vera* extract (0, 0.5, 1 and 2 mg/kg) were assayed in rainbow trout for 60 days. At the end of feeding trial, the blood samples were obtained by puncture of the caudal vein to estimate catalase, superoxide dismutase and glutathione peroxidase. At the end of feeding experiment, our results showed that growth was not significantly affected by *Aloe vera* extract (P>0.05). Enzymatic activity of catalase, superoxide dismutase and glutathione peroxidase was the highest in fish fed the control diet and significantly different from fish fed 0.5 and 2 mg/kg diets (P< 0.05). In conclusion, dietary administration of *Aloe vera* to had no effect on fish antioxidant activity in rainbow trout.



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A SURVEY ON MYCORRHIZAL SYMBIOSIS WITH THE *THYMUS DAENENSIS* AND ITS EFFECTS ON THE ROOT GROWTH

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Mycorrhizae enhance the root system by stimulating rooting and introducing morphological changes in the structure of the root. In addition, it helps to improve the production of secondary metabolites. Based on the beneficial effects of Mycorrhizae on other plants from the Thyme family, such as Basil and Oregano, it is of interest to discover how Mycorrhizal fungi can be used for the rapid and effective production of such species in-vitro [1-3]. In the current study, we have investigated the possibility of establishing in-vitro symbiosis between the *Thymus daenensis* with *Glomus intradices* at the root level. Surface sterilized spores of fungi was inoculated on isolated roots cultured in a liquid Murashige & Skoog (MS) medium both with and without Naphthalene acetic acid (NAA) hormone, and in a modified MS medium where the concentration of Zinc, Phosphor, and Nitrogen was reduced by half. Results indicate that staining the roots of treatments did not appear to show any signs of colonization. However, the average length of the roots cultured in the MS medium both with and without NAA hormone was increased significantly. These findings are quite encouraging and suggest that Mycorrhizal fungi can act as an elicitor and improve the production of Thymus root.

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**EFFECTS OF DIETARY ADMINISTRATION OF *ALOE VERA* ON
SERUM MDA IN RAINBOW TROUT FINGERLINGS**

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This experiment was conducted to examine the effect of dietary *Aloe vera* on serum MDA in fingerling rainbow trout (9.5 ± 0.85). Four experimental diets according to different levels of supplemented *Aloe vera* extract (0, 0.5, 1 and 2 mg/kg) were assayed in rainbow trout for 60 days. At the end of feeding trial, the blood samples were obtained by puncture of the caudal vein to estimate catalase, superoxide dismutase and glutathione peroxidase. At the end of feeding experiment, our results showed that serum MDA was not significantly affected by *Aloe vera* extract ($P > 0.05$). Lowest amount of MDA was recorded in control group and increased by administration of *aloe vera*. Our results showed that dietary administration of *Aloe vera* have negative effects on serum MDA in rainbow trout fingerlings.



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EFFECT OF DROUGHT STRESS ON MORPHOLOGY OF DILL

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Drought stress is an important environmental factor affecting plants growth and yield. To study the effect of drought stress on the morphological traits of dill, this experiment was conducted in 2012 at Alborz research station of Research Institute of Forests and Rangelands, Karaj, Iran. The experiment was conducted in the form of a randomized complete block design with four replications. Treatments were irrigation at 30, 60 and 90% of field capacity. Analysis of variance indicated that drought stress significantly affected plant height, length of the main stem, length of the longest internode, canopy area, stem diameter, number of leaves, number of umbel and umbelet and the number of lateral branches. Mean comparison indicated that plant height (92.24 cm), length of the main stem (75.38 cm), length of the longest internode (35.21 mm), canopy area (25.15 cm²), stem diameter (8.97 mm), number of leaves (210.55), number of umbel (105.32) and umbelet (38.77) and the number of lateral branches (6.61) were the highest in 90% FC (without drought stress). Briefly, results of this experiment indicated that dill is a sensitive plant to drought stress and will have the best morphological features under well irrigated conditions.



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**THE AMOUNT OF ESSENTIAL FATTY ACIDS IN EXTRA VIRGIN OIL
IN FOUR OLIVE CULTIVARS**

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Most of the fatty acids in olives and olive oil are mono-unsaturated. Mono-unsaturated fatty acids do not contain cholesterol. Therefore, olive oil does not raise cholesterol levels but instead keeps them under control. Olive oil also contains omega-6 linoleic acid (EFA: essential fatty acid), which is essential for the human body [1]. Fatty acids have great importance to human health. They support the body hormones, assist the cell membrane formation and help to prevent the formation of prostate cancer cells [2]. The purpose of this research was to study the percent of oleic acid, palmitic acid, linolenic acid, linolenic acid and stearic acid in the extracted oil of four different cultivars of olive (*Olae europaea* L.). The oil was extracted by centrifuge and the fatty acids were measured using gas chromatography. The study was in a completely randomized design with four cultivars including `Zard, `Blaidi, `Arbekin and `Lechino and three replications or trees. The result showed that different cultivars had significantly different percentage of essential fatty acid. Analysis of fatty acids using gas chromatography indicated that `Blaidi cultivar had the highest oleic acid, and the lowest oleic acid content was recorded in `Arbekin cultivar. The greatest percent of palmitic acid was in `Zard cultivar, while the highest linolenic acid content was recorded in `Blaidi cultivar. The minimum amount of palmitic acid was related to `Lechino cultivar, the linolenic acid was lower in `Arbekin cultivar.



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STUDY OF MICROSPORE DEVELOPMENT STAGES IN
THYMUS DAENENSIS

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Thymus daenensis (Lamiaceae) is an endemic species of Iran. This species is valuable medicinal plant because of high concentration of thymol and carvacrol in the essential oil. Domestication and breeding of talent and homogeneous cultivars is necessary for commercial cultivation and production of the plant. Breeding of hybrid or synthetic cultivar needs pure or inbred lines. Androgenesis is one of the most efficient methods for doubled haploid production and suitable technique for regeneration of pure lines. Developmental stage of microspore is an important element of successful androgenesis as most of the plant species show the best response in uninuclear stage. In this study different developmental stages of pollen were determined. The flowers in different developmental stages were taken and stained using Acetocarmine Chemical Reagent in six different staining periods (5, 15, 25, 35, 45 and 55 min). The best staining result was obtained with the use of 2 % Acetocarmine for a period of 45 min. The buds with uninuclear microspores were those of which had 1.5-1.6mm in diameter with 3.8 – 4.4mm average in length. The buds reach to this developmental stage 5-7 days after initiation.

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THE STUDY OF ANTIOXIDANT ACTIVITY OF ETHANOLIC AND
METHANOLC EXTRACTS OF *QUERCUS INFECTORIA* GALLS

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Today we know well that radicals cause molecular transformations and gene mutations in many types of organisms [1]. Antioxidant supplements have the key role in reducing oxidative damage. The number of antioxidant compounds synthesized by plants as secondary products [2]. Based on studies, *Quercus infectoria* galls have phenolic compounds that were found to have antioxidant activity in the inhibition of LDL oxidation [1]. This study was aimed at determining the antioxidant activity of *Quercus infectoria* galls for the first time in Iran. *Quercus infectoria* galls (*Andricus sternlichti* and *Andricus moreae*) were collected from Oak forests, Lorestan, Iran. So ethanolic and methanolic extracts of this galls were prepared and antioxidant activity was determined by DPPH (2, 2-diphenyl-1-picrylhydrazyl) free radicals scavenging activity [3]. In this study IC₅₀ for DPPH radical scavenging activity was 0.89 µg/ml for ethanolic extracts of *Andricus sternlichti*, 1.38 µg/ml for methanolic extracts of *Andricus sternlichti*, 1.53 µg/ml for ethanolic extracts of *Andricus moreae* and 1.83 µg/ml for methanolic extracts of *Andricus moreae*, respectively. The antioxidant activity of *Andricus sternlichti* was higher than *Andricus moreae*, which was due to difference in their phenolic content. A high correlation was found between the antioxidant activity and total phenolic content. These results indicate that *Q. infectoria* galls possess potent antioxidant activity and they have the potential to be used as natural antioxidants in relevant industries [3, 4].

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**ANTIMICROBIAL ACTIVITY OF ZATARIA MULTIFLORA BOISS.
ESSENTIAL OIL AGAINST VANCOMYCIN-RESISTANT
ENTEROCOCCI (VRE) IN MINCED BROILER MEAT**

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Enterococci are important Gram-positive bacteria of food safety and public health concern. Among the predominant bacteria involved in these pathogens, enterococci are a leading cause of gastroenteritis resulting from the consumption of contaminated food. Antimicrobial-resistant enterococcal strains have been isolated from meat products, dairy products, fresh produce and the poultry production environment. Among antibiotic resistant enterococci, the emergence, selection and spread of enterococci resistant to glycopeptide antibiotics vancomycin in a hospital environment is of particular concern, because glycopeptide antibiotics often represent the last therapeutic option in the treatment of infections caused by enterococci. The demand for safe foods, coupled with the preference by consumers for foods free of synthetic additives, has increased the interest for natural preservatives in recent years. *Zataria multiflora* Boiss. with the common Persian name “Avishan-e Shirazi” was evaluated for antibacterial properties, against Vancomycin-Resistant Enterococci (VRE). *Zataria multiflora* Boiss. Essential oil was introduced into Brain Heart Infusion agar (BHI) (15ml) at a concentration of 0.25 to 2% (vol/vol) to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) for Vancomycin-Resistant Enterococci (VRE) evaluated. Furthermore, the inhibitory effect of *Zataria multiflora* Boiss. Essential oil was evaluated against VRE, experimentally inoculated (10^3 cfu/g) in minced broiler meat, which was mixed with different concentrations of *Zataria multiflora* Boiss. essential oil (0.1%, 0.5% and 1%) and stored at 7 °C for 14 days. The addition of *Zataria multiflora* Boiss. essential oil at concentrations of 1% caused best significant reduction in the growth rate of VRE in meat at 7 °C. The results revealed the potential of *Zataria multiflora* Boiss. essential oil as a natural preservative in minced broiler meat against VRE contamination.

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**ANTIMICROBIAL ACTIVITY OF SAFFRON AGAINST *SALMONELLA*
ENTERITIDIS IN FOOD**

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Salmonellas are members of the Enterobacteriaceae. Based on somatic, flagellar, and capsular antigen types, over 2,000 serotypes of *salmonella* have been classified. Among these, *S. enterica* subsp. *Enterica* serotype *Enteritidis* (also known as *Salmonella Enteritidis*) is the most common causative agent of foodborne salmonellosis. In addition, *S. Enteritidis* has been recognized as a major cause of all foodborne disease due to pathogenic bacteria. *Salmonella* infection in humans mainly results from consumption of contaminated foods, especially ones of animal origin, including beef, milk, chicken and egg. Foodborne salmonellosis is characterized by diarrhea and abdominal cramps. Since the disease not only affects people's health and well-being, but also has an economic impact on individuals and countries, many efforts have been spent to find approaches to reduce or eliminate *Salmonella* that contaminates foods. Plants and plant products represent a source of natural antimicrobial substances to be used in foods because many of them have been part of the human diet for hundreds of years, and have been reported to possess antimicrobial activity. Saffron, *Crocus sativus*, is the most expensive spice in the world. Saffron though cultivated in different parts of the world, is mainly cultivated in Iran. It has wide range of medical uses such as antitumor, antifungal and anti-inflammatory activities. The identification of the *Salmonella enteritidis* in foods was confirmed by using two primers for polymerase chain reaction (PCR). Two primers were designed for the *Salmonella* Enterotoxin (*stn*) gene. The size of the PCR product was 260 bp. The antimicrobial activity of methanol extract of saffron against *S. enteritidis* was evaluated by swab paper disc method. Methanol extract of saffron at a concentration of 50 ppm reduced the number of bacteria in the food from 5 to 2 log cfu/g after storage for 3d. The results from this study confirm the potential use of methanol extract of saffron as an antimicrobial agent to control *S. enteritidis* in food.

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CHARACTER ASSOCIATION AND PATH ANALYSIS OF BLACK SEED (*NIGELLA SATIVA* L.) GENOTYPES UNDER DIFFERENT IRRIGATION REGIMES

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Character association and path analysis were performed for black seed cultivars using a split-plots design based on RCBD with three replications. Three cultivars (Varzaneh, Semirom and Mobarakeh) were studied under three levels of irrigation (normal irrigation, irrigation with drought stress before and after flowering). Under normal and abnormal irrigations the relation of seed yield and three characters biological yield, number of capsule per plant and thousand seed weight were high, positive significantly ($P \leq 0.01$); the relation between yield and number of sub branch was positive significantly ($P \leq 0.05$). In terms of abnormal irrigation there was a positive significant correlation between essence percent and yield ($P \leq 0.05$). Under normal irrigation the most direct effect of traits on yield was obtained from biological yield (0.778) followed the number of capsules per plant (0.245). The most indirect effect of traits on yield was obtained from biological yield through thousand seed weight (0.576) followed stem diameter through biological yield (0.468). Under water deficiency conditions the most direct effect of traits on yield was obtained from biological yield (0.811) followed the number of capsules per plant (0.231). The most indirect effect of traits on yield was obtained from biological yield through thousand seed weight (0.562).

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THE STUDY OF GROWTH REGULATOR COMPOSITION AND TYPE OF EXPLANT ON CALLUS FORMATION IN SEBESTAN MEDICINE PLANT (*CORDIA MYXA L.*)

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Sebestan is a tree, belonging to the Boraginaceae family which has various species that *cordia myxa L.* use widely in traditional medicine as a drug. This tree grows in south area of Iran especially seacoast of Persian Gulf from Baloochestan to Khouzesan. Sebestan fruit is an important source of mucilage that use in pharmacy industry. Mucilage is contain of fructose, glucose, arabinose, galactose, gxylose and galacronic acid. This plant use as a emollient in cure of coughing also to decrease blood pressure, to quench the thirst, to relieve urine burning, to cure of renal calculus and to whet the appetite. Medicine coefficients of this plant extract from fruit mucilage, bark, root, leaf, and seed. So, high percentage of callus formation is necessary for secondary metabolite extraction and to produce colon plants in short time to use in pharmacy industries. The study was conducted to analysis the effect of growth regulators treatment and type of explant on callus formation in Sebestan (*cordia myxa L.*) in Ramin University. In this research, MS media which was completed with different hormon compositions containing IBA in three levels (0.5, 1 and 2 mg/l), BAP in two levels (0.05 and 0.1 mg/l) and type of explant (cotyledon and hypocotyl), was studied. Finally, after 6 weeks, the weight of produced callus was analysed. The results showed that the concentration of hormones had significant effect on 1% level ($p < 0.01$) of Duncan Test on produced callus. The highest callus formation was achieved on MS media completed with 1mg/l IBA and 0.1 mg/l BAP. Also, the results showed that the type of explant on the weight of produced callus under 1% was significant effect and the best conclusion was derived from hypocotyl explant.

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**ARSENIC DETERMINATION IN GARLIC BY GFAAS AFTER
SUBCRITICAL WATER EXTRACTION**

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It has been evidenced that arsenic in garlic is present in the most toxic inorganic species As (III) and As (V). So, in order to assess the risk of As for human health, the determination of the inorganic arsenic present in foods is of great importance. Arsenic has been classified by the International Agency for Research on Cancer as carcinogenic to humans. The determination of As(III) and As(V) was based on the different efficiencies of hydride generation with NaBH₄ [1]. Subcritical water extraction (SWE), using hot water under pressure, has recently emerged as a useful tool to replace the traditional extraction method [2]. We carry out SWE method for arsenic extraction from garlic (Domestic garlic bought from market) using hot water (from 120 to 210 °C) under medium pressure (from 3 to 30 bar) to maintain water in the liquid state and then the six collected samples was analyzed by GFAAS (GBC 2000/3000) and graphite platform inserted in the furnace. Ashing and atomization temperature was 1100 and 2000 °C. The matrix modifiers were MgNO₃ + PdCl₂ for determination of arsenic. After 15, 30, 45 minutes subcritical water extraction in 120 °C, Arsenic content in domestic garlic were found 0.91, 1.30, 1.49 ppm, respectively.

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COMPARISON OF CYTOTOXIC EFFECTS OF METHANOLIC
EXTRACT AND ESSENTIAL OIL OF *ACHILLEA WILHELMSII* C.
KOCH ON HT29 CELL LINE

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Cancers diseases have always been an important concern of humanbeing and attracted the attention of a large number of professionals from the medical and laboratory community [1]. Many plants in clinical studies of phytochemical are evaluated as antitumor activity against various cancers[2]. Currently, cancer patients suffering from medication side effects and try to be better treated with alternative complementary medicine[3].The aim of this study was comparison of cytotoxic effects of methanolic extract and essential oil of *Achillea wilhelmsii* on HT29 cell line. In this study cytotoxic effects of methanolic extract and essential oil were obtained respectively by soxhlet apparatus and Clevenger *in vitro*. Concentrations 12.5, 25, 50, 100 µg/ml of methanolic extract and 2, 3.2, 4, 4.8, 5.6, 7.2, 16, 24, 32 , 40µg/ml essential oil were prepared and measured by MTT method. The results from this study were showed that: the difference of the methanolic extracts of flower at concentration 12.5µg/ml and also the comparison of essential oil with control group was significant at all concentrations (P<0/05) and cell death is triggered. The findings suggest that the essential oil has a more powerful effect than the methanolic extract of flower due to existence phenolic compounds, especially flavonoids has an inhibitory effect on the HT29 cell line but essential oil of flower due to existence monoterpene compound such as Camphor, α-Pinene and 1,8-Cineole, has a potent inhibitory on HT29 cell line.

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STUDY THE EFFECTS OF ORGANIC MANURE AND WATER DEFICIENCY ON QUALITATIVE AND QUANTITATIVE YIELD OF PEPPERMINT (*MENTHA PIPERITAL.*)

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An experiment was conducted to study the effects of organic manure levels (0, 5 and 10 tonha⁻¹ of vermicompost) and different water deficiency values (irrigation based on 50, 75 and 100 percent of plant water requirement) on qualitative and quantitative yield of peppermint (*Mentha piperita* L.) under Kermanshah climate conditions. The experimental design was factorial established upon randomized complete block design with three replications. Harvesting was performed twice. Clevenger method was used to essence extraction. Analysis of variance and comparing the means of the treatments using LSD values indicated significant differences among studied treatments ($p \leq 0.05$). Use of 10 tons of vermicompost per hectare and irrigation based on %75 of plant water requirement produced the highest essence value (135.08 kg per hectare); but irrigation according to %100 water requirement and same amount of vermicompost produce maximum fresh and dried leaf weight (27.03 and 10.25 ton per hectare for fresh and dried yield, respectively and two harvestings). Segregation of sum of squares revealed a significant linear regression between the amounts of fertilizer and peppermint yield ($p \leq 0.05$).

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INVESTIGATION OF ANTHOCYANINS AMOUNT IN THREE SPECIES
OF MEDICINAL FORESTAL FRUIT IN GOLESTAN PROVINCE

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Anthocyanins are the largest group of water-soluble pigments in the plants that have property of being anticancer, anti-inflammatory, antioxidant, preventive and therapeutic effects on cardiovascular disease. They belong to a parent class of molecules called flavonoids synthesized via the phenylpropanoid pathway, they are odorless and nearly flavorless, and contributing to taste as a moderately astringent sensation [1, 2]. This research was conducted on three species of medicinal forestal plants including: *Crataegus oxyacantha* (Rosaceae), collected from Olang Mountain in Ramiyan, at an altitude of 2000 m; *Rosa canina* (Rosaceae), collected from Afratakhteh in Aliabad at an altitude of 1500 m; *Diospyros lotus* (Ebenaceae), collected from towshan in Gorgan, at an altitude of 200 m. Measuring the amount of anthocyanins was performed by using spectrophotometry techniques (Wagners method). Results showed the amount of anthocyanins in the *Crataegus oxyacantha* (1.126); *Diospyros lotus* (0.036) and *Rosa canina* (0.044) in terms of $\mu\text{M.g}$ Amount of anthocyanins in *Crataegus oxyacantha* is almost three times the amount of this substance in others two species.

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**EVALUATION OF PHYTOCHEMICAL ACTIVITY OF
ACHILLEA MICRANTA AND *ACHILLEA MILLEFOLIUM* L. EXTRACT
IN EAST NORTH OF GOLESTAN PROVINCE**

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Flowers of two species of *Achillea* named *A. millefolium* L. and *A. micranta* belong to the Asteraceae family has been used by the rural people in traditional medicine as astringent, antinociceptive and wound healing were gathered from cold areas in different locations from Chaharbagh and Minu dasht (region of East North of Iran) respectively. They were analyzed for composition of phenolic compounds which present in *Achillea* species are constitute one of the most important groups of pharmacologically active substances. The methanol extracts were analyzed by aluminum chloride (AlCl₃) method using the Folin-Ciocalteu reagent. Total flavonoid content was determined using aluminium chloride (AlCl₃) and quercetin (standard). TP and TF contents were (18.5 and 12.35 mgGAE g⁻¹) and (80 and 61 mgQUE g⁻¹) for *A. millefolium* and *A. micranta* respectively. *A. micranta* that collected in Minu dasht showed better phytochemical activity. These results confirmed to traditional uses of this plant as antioxidant, anti-inflammation, wound healing and treatment of bleeding.



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**EVALUATION OF ANTIOXIDANT ACTIVITY OF METHANOL
EXTRACT OF TWO *ACHILLEA* SPECIES IN EAST NORTH OF
GOLESTAN PROVINCE**

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In the 21st century, attention is focused on the cultivation and preservation of medicinal and aromatic plants and on the evaluation of their quality. Inflorescence of two medical plants *Achillea millefolium* L. and *Achillea micranta* belong to Asteraceae family were collected from Chahar Bagh and Minudasht mountains (2000 m high) in East North of Golestan province. The antioxidant properties were obtained by various methods including reducing power (RP), total antioxidant capacity (TAC) and 2, 2-Diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity. The antioxidant activity (IC₅₀) in TAC and RP methods were (1549-1022 µg/ml) in *A. millefolium* and (1009-814.2 µg/ml) in *A. micranta*. The IC₅₀ in DPPH method was (189-232 µg/ml) respectively. Therefore, reducing power assay had more antioxidant activity than TAC and RP methods. These results indicated that the use of flowers of these plants growing in mountains can be a confirmation for using this plant in traditional medicine, as antiseptic and antioxidant effect.



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**CHANGES IN ESSENTIAL OIL PERCENT AND YIELD OF POT
MARIGOLD (*CALENDULA OFFICINALIS*) IN DIFFERENT DOSES
AND TIMES OF NANO-IRON FOLIAR APPLICATION**

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In order to evaluate the effect of concentration and time of iron on essential oil yield of Pot Marigold (*Calendula officinalis*), a field experiment as factorial was carried out based on randomized complete block design with three replications at the Research Farm of Urmia University (latitude 37.53 N, 48 08.E, and 1320 m above sea level), Urmia, Iran in 2011. The experiment treatments including iron concentration at four levels (0, 1, 2 and 3 g.liter⁻¹) in four levels of application time including 1- stem initialize, 2: flowering, 3: after first harvest and 4: after second harvest was used. Results showed that a significant difference between spraying time on yield and essential oil percent at the second harvest, the flower yield at first and second harvest. The effect of Nano-iron concentration was significant on the essential oil yield at first harvest and on the yield of flower at second harvest. However, there was a significant interaction effect between iron spraying time and concentration on the flower yield at third harvest. Between iron concentration, application 1 g.liter⁻¹ at third harvest produced the maximum flower yield (145.6 kg.ha⁻¹), But the latest application treatments produced fewer yields compared to controls. The highest essential oil percent and flower yield in Nano-iron application at stem initialized (early usage) led to the highest essential oil yield (2.39 kg.ha⁻¹) in this treatment. Maximum and lowest essential oil percent (1.57 and 0.98 % respectively) were obtained from spray application at stem initialized and after second harvest, respectively. Nano- iron foliar application at stem initialized produced the maximum flower yield at first harvest (405.3 kg.ha⁻¹). The lowest flower yield (261.6 kg.ha⁻¹) belonged to iron – spraying after second harvest.



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**EFFECTS OF ORGANIC FERTILIZERS ON GRAIN AND FRUIT
YIELD OF PUMPKIN (*CUCURBITA PEPO* CONVAR. *PEPO* VAR.
STYRIACA)**

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The use of organic soil amendments for crop production has become increasingly important around the world. Pumpkin is classified as a high-fertilized vegetable, because of its ability to produce a lot of biomass. To study the effects of different organic soil amendments on yield and yield components of pumpkin, a field experiment was conducted at College of Agriculture, University of Zanjan in the spring of 2012. The experiment was conducted as a randomized complete block design with three replications. In this experiment the effect of different levels of organic fertilizer such as cattle manure, vermicompost and humic acid compared to controls were studied. Results showed that most traits including grain and fruit yield, fruit number per plant, grain number per fruit, 1000 grain weight were significantly affected ($p \leq 0.05$) by different fertilizing treatments. Majority of mentioned traits were increased by application of organic fertilizers cattle manure, vermicompost and humic acid compared with control. So the highest grain (967.8 kg/ ha) and fruit (49.80 ton/ha) yields were obtained by 30 ton/ha vermicompost and the lowest amounts of mentioned traits were obtained by control. It seems that application of organic fertilizers can considerably improve the performance of Pumpkin.

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**THE EFFECT OF PLANTING DENSITY AND PLANTING TIME ON
*SATUREJA SAHENDICA***

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To study the effect of planting density and planting time on *Satureja sahendica*, this experiment was conducted in 2011-2012 at Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experimental design was split plot in the form of a randomized complete block design with three replications. The main factor was planting time (fall and spring) and the sub factor was planting density (80 × 80 cm, 60 × 60 cm, 40 × 40 cm and 20 × 20 cm). Harvest was conducted at flowering stage and the essential oil was produced from dried shoots by hydrodistillation in 2 hours. Analysis of variance indicated that two factors significantly affected all the measured traits. The interaction of the two factors had also a significant effect on plant height, the number of lateral stems on the main stem, flowering shoot yield, essential oil percentage and yield. Mean comparison indicated that all measured traits were the highest in fall planting time. Mean comparison of planting densities showed that the highest number of tillers (7.67 and 6.5) was achieved in 80 × 80 and 60 × 60, respectively. The highest single plant yield (22.1 g/plant) was achieved in 80 × 80, the highest shoot yield (1754.2 kg/ha) in 20 × 20 and the highest essential oil yield (20.761 kg/ha) was achieved in 20 × 20. Mean comparison of the interactions also indicated that the highest flowering shoot yield was achieved in fall × 40 cm², fall × 20 cm² and spring × 20 cm². The highest essential oil percentage and yield were observed in fall. Generally, results of this experiment indicated that to obtain higher essential oil yield and shoot yield in the first year, planting in fall is advised.



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**ANTI-OXIDANT AND ANTI-BACTERIAL PROPERTIES OF ETHANOL
EXTRACTS OF ALGAE (*ENTREROMORPHA INTESTINALIS*,
CYSTOESIRA MYRICA, *GRACILARIA CORTICATA*) FROM THE
COASTAL WATERS OF BUSHEHR PROVINCE
(NORTHERN PERSIAN) WITH PHENOL & RP TESTS**

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A large number of natural resources like algae rich in antioxidants can be used as food additives the application of seaweed antioxidants in foods, food supplements, nutraceuticals and medicine is considered from the perspective of benefits to human health. Free radicals are usually unstable compounds, which are highly reactive and high energy to cause oxidative damage in lipids, proteins and nucleic acids that leading to various diseases in humans. Algal samples were collected by hand from the intertidal zone during low tide along the coastal areas in Bushehr Province. Studies were conducted for quantifying the seaweeds during two seasons from July 2012 until October 2012. Samples were identified to genus and species on examination of morphology and anatomical characteristics. Collected sea weed contain *Entreromorpha intestinalis*, *Cystoesira myrica* and *Gracilaria corticata* were washed with clean seawater and placed in distilled water was replaced once every few hours. Finely extraction was performed at room temperature with 70% alcohol extraction procedure was performed at room temperature. Assessment of total phenol levels in samples algal extracts was measured by the method of Folin-Ciocalteu. Phenol and anti-oxidant activity measured by method of reducing power (RP) was measured according to the method of Singh and Rajini. Concentrations of 50,100,150 mg extract of algae were prepared in distilled water. Antimicrobial susceptibility testing by the disk diffusion and well diffusion method and repeated three times for each concentration was well done. Since results were averaged in each phase. The total phenolic content (TP) in the range of 8.80 ± 5.3 to 9.436 ± 5.35 mg Gallic acid/g extract, respectively. The highest antioxidant activity of green algae (*E. intestinalis*) (0.9 ± 0.76) and lowest antioxidant activity of brown algae (*C. myrica*) (0.36 ± 0.04) were tested with RP test. Hydroalcoholic extracts of algae has no effect on the bacteria *Listeria monocytogenes* and *Escherichia coli*. Green algae (*E. intestinalis*) showed the highest antioxidant activity. Anti-oxidant effects of plant and algal materials can be attributed to their flavonoids and phenolic compounds. Anti-oxidant activity green algae (*E. Intestinalis*) may be due to phenolic compounds that are present in green algae. Chlorophyll b is an antioxidant property is found only in green algae. The RP test did not show significant differences between the antioxidant properties of algae (sig > 0.05). There was significant differences between phenolic content and antioxidant properties by RP test (sig < 0.05).



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**EVALUATING THE EFFECT OF DROUGHT STRESS ON
MORPHOLOGY OF CHAMOMILE FROM KHUZESTAN, IRAN**

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To study the effect of drought stress on some morphological traits of chamomile (*Matricaria chamomilla*), this experiment was conducted in split plot in the form of a randomized complete block design with three replications. The main factor was drought stress (induced by irrigating after 60, 90, 120 and 150 mm evaporation from the A class evaporation pan) and the sub factor was harvest (two harvests). Analysis of variance indicated that drought stress significantly affected plant length, the number of lateral stems, fresh and dry flower yield, leaf yield, stem yield and root yield ($P \leq 0.01$). Harvest time significantly affected dry flower yield and the number of lateral stems ($P \leq 0.05$). The interaction of drought stress \times harvest time had also a significant effect on fresh and dry flower yield, leaf yield, stem yield and plant length ($P \leq 0.01$), and the number of lateral stems and root yield ($P \leq 0.05$). Results showed that dry flower yield, leaf yield, stem yield and root yield were higher in the second harvest time. Mean comparison of different drought stress levels indicated that the highest plant length, fresh and dry flower yield, leaf yield, stem yield and root yield were achieved when irrigation was conducted after 60 mm evaporation. Studying the mean comparison of the interaction of two factors also indicated that all traits significantly reduced in 150 mm drought stress level. So, to obtain the highest chamomile yield it is recommended, based on the results of this experiment, to irrigate the field after 60 mm evaporation and harvest the plant in the second harvest time.



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**RESPONSE OF TWO CHAMOMILE POPULATIONS TO DROUGHT
STRESS AND HARVEST TIME**

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In order to study the effect of drought stress and harvest time on two populations of chamomile (*Matricaria chamomilla*), this experiment was conducted in split plot in the form of a randomized complete block design with three replications. The main factor was drought stress (induced by irrigating the field after 60, 90, 120 and 150 mm evaporation from the A class evaporation pan), the sub plot was population (two populations) and the sub-sub factor was harvest (two harvests). Analysis of variance indicated that drought stress significantly affected root yield ($P \leq 0.05$) and total plant length ($P \leq 0.01$). Moreover, flower yield, leaf yield, stem yield, root yield and plant length were significantly different between the two populations. The interaction of drought stress \times populations significantly affected root yield ($P \leq 0.01$) and plant length ($P \leq 0.05$). Mean comparison of two harvests indicated that flower yield, leaf yield, root yield and plant length were higher in the second time than in the first time. Mean comparison of drought stress levels indicated that the highest flower yield (155.83 kg/ha) was achieved in 90 mm evaporation; reducing the severity of drought stress from 90 mm to 60 mm increased leaf yield, stem yield, root yield and plant length. Results of this experiment indicated that the highest flower yield, leaf yield, stem yield, root yield and plant length were achieved in mild drought stress (90 mm) in population two.



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**CHEMICAL COMPOSITIONS OF THE ESSENTIAL OILS OF
*SCALIGERIA MEIFOLIA***

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Scaligeria belongs to the family of Umbelliferae (Apiaceae), and is represented in Iran by seven species, which is located in natural habitat. In this Research the aerial parts of *Scaligeria melfolia* were collected and then essential oil were obtained by hydro-distillation method using Clevenger apparatus and its essential oil was analyzed by GC and GC/MS. Results of GC/MS analysis was showed that, a total of 52 compounds representing 92% were identified of the oil. The main components of the oil were Sabinene (27.1%), α -Pinene (10.94%), Myrcene (7.03%), Bornyl acetate (4.07%), Terpinene-4-ol (3.86%), γ -Terpinene (3.6%), α -Thujene (3.23%), Germacrene D(3.04%).

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COMPARISON OF HYDRO DISTILLATION (HD), STEAM DISTILLATION (SD) AND MICROWAVE FREE SOLVENT EXTRACTION (SFME) ON FLOWERS ESSENTIAL OIL OF *HYPERICUM PERFORATUM*

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Essential oil yield and chemical composition of aromatic plants was affected by many parameters. It is necessary to identify the most suitable extraction method for obtain the highest quantity and quality essential oils. In this study, essential oils from flowers *Hypericum perforatum* was obtained by hydrodistillation (HD), steam distillation (SD) and microwave free solvent extraction (SFME). Oils were analyzed by GC/MS and a firm identification of the components was performed by comparison of relative retention indices and mass spectra with authentic reference. Essential components analysis showed that in the method HD α - pinene (29.15%), β - selinene (18.24%), octane (7.36%) and Caryophyllene oxide (5.17%) respectively, and by SD method Nonacosane (18.07%), p-Xylene (13.10%), β - selinene (11.44%), α - selinene (11.27%) and α - pinene (6.03%) respectively, and by SFME method α - selinene (21.68%), β - selinene (21%), Caryophyllene oxide (10.35%) and α - pinene (8.55%) respectively. The results show that the changes in the chemical composition of differences in extraction methods may be obtained.

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**ANTIOXIDANT PROPERTIES OF CHLOROFORM, METHANOL
AND WATER EXTRACT OF HYRCANIAN *GANODERMA LUCIDUM*
KARST.**

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It has been few decades in which natural biomaterials, concerning mushrooms, are investigated for antioxidant activity to replace the synthetic antioxidants causing cancer [1]. Wood decaying fungi, mostly belonging to the order polyporales express significant biological effects [2]. They are easily recognized and collected in the field and their secondary metabolites can be extracted quickly [3]. *Ganoderma lucidum* Karst., (family: Ganodermataceae) is an annual medicinal and wood decaying fungus. This species known by the common names Reishi or Mannentake (Japanese), Ling Zhi (Chinese) and Yung Zehi (Korean) possess magnificent medicinal properties such as anti cancer, anti diabetes and anti cholesterol. The aim of this study was to examine the antioxidant properties of three different extracts from *Ganoderma lucidum* in the form of mature fruit bodies. Three different methods were used for antioxidant studies: FRAP, DPPH and ABTS. Among these extracts, the chloroform extract showed the highest radical activity by 6.07 μ g/ml for DPPH, 37.68 μ mol Trolox/g extract for Ferric reducing activity but the best activity in ABTS test was achieved by methanol extract with the 31.57% for 200 μ g/ml.

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**OPTIMIZATION OF HPLC-FLD METHOD FOR
DETERMINATION OF PSP TOXINS IN PERSIAN GULF AND OMAN
SEA SHELLFISH**

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Paralytic shellfish poisoning (PSP) toxins are highly toxic natural compounds produced by marine harmful red tide phytoplankton, mainly dinoflagellates. Toxins accumulate in the tissues of filter-feeding shellfish after feeding on these algae. Paralytic shellfish poisoning (PSP) is one of the most important forms of food poisoning caused by ingestion of seafood. It is acute and often fatal. PSP symptoms appear after eating of the shellfish by humans, and enter of these toxins to the human body [1]. In the present study, for first time we optimized the analysis of PSP toxins in Persian Gulf and Oman Sea Shellfish by HPLC with fluorescence detection and post column reaction. Chromatographic condition included isocratic system and phosphate buffer/acetonitril as mobile phase on a C18 column (4.6 mm×250 mm, 5 μm) at flow rate of 0.8 ml min⁻¹. Two comparisons extraction method was occurred, first extraction included adding of 0.1 M HCL to shellfish mussel and then injection. Two extraction included clean-up with solid-phase extraction (SPE). The matrix-matched calibration graphs for NEO saxitoxin were prepared by injecting the extracted blank spiked with increasing amount of standards at 400 μg kg⁻¹ level, giving an acceptable linearity ($r = 0.997$) over the test range. The comparison between blank and spiked sample peaks showed a recovery 70%. The LOD and LOQ for neosaxitoxin were 0.39 and 1.29 μg kg⁻¹, respectively. Finally, it was concluded that SPE method, due to the elimination interfering compounds had better efficiency for analyzing of PSP.

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**EFFECT OF PLANT DENSITY ON YIELD AND YIELD COMPONENTS
OF VARIOUS LAND RACES OF FENUGREEK (*TRIGONELLA
FOENUM GRACUM* L.) IN KERMAN CLIMATOLOGIC CONDITIONS**

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Fenugreek (*Trigonella foenumgracem* L.) is one of medical herbs that has a long history of use, in world and Iranian traditional medicine and many considerable curing effects have been reported for it. In order to evaluation the effect of plant density of some land races of Fenugreek on its yield, this experiment was conducted in Kerman Shahid Zندهood research Station, in 1391 (2112). 4 land races (Kermani, Esfahani, Ardestani, Hendi) and 3 plant densities (26.6, 40, 80 plants/m²) were compared using RCBD with factorial plots and 3 replications. Wet yield, economic yield, length and width of leaves, plant height, canopy coverage, number of legumes, number of seeds per plant, number of seeds per legume, 1000 seeds weight and were measured. Data were statistically analyzed by MSTATC software and means were compared by Duncan multi range test ($\alpha=5\%$).

Results showed that land races were significantly different in all measured attributes except for number of main branches. Plant density did not affect any attributes from seeding till germinating step, but had statistically significant effect on all attributes. Land races had high diversity in all measured attributes. Highest wet yield and economic yield (16557.8 and 1675.3 Kg/ha) obtained from Ardestani landrace. Increasing in plant density had considerably increased fenugreek biomass. The least yield (6391.7 kg/ha) was obtained by the least plant density of 26.6 (plants/m²) that 1.5 and 3 fold increase in plant density increased yield by 9476.7 and 15060 (kg/ha), respectively. According to results the highest plant yield obtained from Ardestand landrace and plant density of 80 (plants/m²). Results of this experiment are in accordance with reports by Singh et.al. (2005), Seghatoleslami, Aahmadibonakdar (1389 (2010)) and Sharma (2000) that reported higher yield by higher plant density.

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COMPARISON OF CHEMICAL CONSTITUENTS OF ESSENTIAL OIL
AND POLYPHENOL AND ANTIOXIDANT ACTIVITY OF
METHANOLIC EXTRACTS THE *PYCNOCYCLA NODIFLORA*

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The Apiacea family comprising about 300 genera and 3000 species worldwide is also widespread in Iran. The *Pycnocycla* L. is represented in the flora of Iran by eight species which all endemic. *Pycnocycla nodiflora* is perennial herb which belongs to Apiacea family which is widely distributed over the south and southeast of Iran.[1-4] Antioxidants are a group of substances when present at low concentrations compared to oxidized substrates significantly inhibit or delay oxidative processes, while being oxidized themselves. It has been established that oxidative stress is among the major causative factors in induction of many chronic and degenerative diseases including atherosclerosis, ischemic heart disease, ageing, diabetes mellitus, cancer, immune suppression, neurodegenerative diseases and others [5-9]. *Pycnocycla nodiflora* has difference combinations, such as phenolic compounds and some of antioxidants. Medicinal herb and aromatic oils are an important source of phenolic compounds, such as terpenoids and their derivatives are formed. Because of the strong relationship between phenols and polyphenols and has antioxidant activity, this study identifies the essential compounds and polyphenols and antioxidant activity of the essential oil and methanol extract of roots and shoots of *Pycnocycla nodiflora* in the vegetative stage. The plant materials were dried in shade and their essential oils were obtained by hydro-distillation and analyzed by GC and GC/MS. Methanolic extracts of *Pycnocycla nodiflora* were investigated for their antioxidant activity by DPPH assay. The polyphenol compounds of *Pycnocycla nodiflora* were analyzed by HPLC. The yield of oils was (0.03%). Essential chromatogram of *Pycnocycla nodiflora* showed that 40 compounds representing 96.99 % of the total oil were identified β -sinesal (15%), β -sesquiphellandrene (12.2%), santalol (11.6%), germacrene D (7.2%), β -ocimen (%5.7), bicyclogermacrene (5.2%), β -eudesmol (5%), α -eudesmol (4.6%) were the main compounds at the vegetative stage. The polyphenol compounds of *Pycnocycla nodiflora* in aerial parts was: Cacchin (16950122), narenjinic (0.8191), vanilic (6.04211), caffeic (389.911), galic (47.361642), chlorjenic (51.3168) ppm and at root was: Cacchin (3.831),galic acid (22303.98), narenjinic (27585.7068), vanilic (5.8153), caffeic (178.603), chlorjenic (16.72) ppm. IC₅₀ for antioxidant activity for essential oil 3460 ppm and methanolic extract of area part 461.68 and methanolic extract of root 1485.735 μ g/ml (by DPPH).



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COMPARISON OF CHEMICAL CONSTITUENTS OF POLYPHENOL
AND ANTIOXIDANT ACTIVITY OF AREAL PARTS OF
PYCNOCYCLA NODIFLORA AT DIFFERENT GROWTH STAGE

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Today we know well that radicals cause molecular transformations and gene mutations in many types of organisms. Antioxidants are main factors for neutralizing the free radicals which are active and harmful materials. Antioxidants, which can inhibit or delay the oxidation of an oxidizable substrate in a chain reaction, therefore, appear to be very important in the prevention of many diseases. The number of antioxidant compounds synthesized by plants as secondary products. *Pycnocycla nodiflora* is a perennial and spinous plant belongs to Umbelleferea family, which is widely distributed over the south and southeast of Iran and is endemic of Iran. Umbelleferea is known to be a potential source for the antioxidant agents. Methanolic extracts of areal parts of the *Pycnocycla nodiflora* at different growth stage were prepared as follows: 20 g dry plant was macerated in 200 ml methanol/water (90/10) for 2 days with one change of solvent after 1 day. The extract was filtered and then concentrated in a rotary evaporator in less than 10 min. Powders were weighed to calculate the yield, and kept at -20 °C until used. Shortly before each experiment, the powder was dissolved in methanol at the desired concentration and was tested for antioxidant activity and phenolic content. The antioxidant activity of plant extract was assessed on the basis of radical scavenging effect of the stable 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical. The antioxidant activity (AOA) is given by: $100 - [(A) \text{ sample} - (A) \text{ blank}] \times 100 / [(A) \text{ control}]$. The IC₅₀ of each sample (concentration in µg/ml required to inhibit DPPH radical formation by 50%) was calculated. The data were statistically analyzed by SPSS software using ANOVA (P<0.01). Phenolic compounds were identified by HPLC. The IC₅₀ for antioxidant activity in the following order: 461.68, 1415.70, 1222.22 µg/mL, in vegetative and flowering and fruit stage respectively (by DPPH). The polyphenol compounds of *Pycnocycla nodiflora* in aerial part was: Cacchin (16950122, 403.571, 2740.032), narenjinic (0.8191, 195.11, 505446), vanilic (6.04211, 36.6567, non), caffeic (389.911, 321.61, 306.857), galic (47.361642, non, 91.863), chlorgenic (51.3168, 35.096, 44.7747) ppm. Our results showed that *Pycnocycla nodiflora* were rich in phenolic constituents and demonstrated good antioxidant activity at fruit stage. These plants, rich in phenolic acids could be a good source of natural antioxidants. Therefore, qualitative and quantitative analysis of major phenolics in the spices could be helpful for explaining the relationships between total antioxidant capacity and phenolic contents in the species.



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PRODUCTION OF LIGNANS IN CALLUS CULTURE OF *LINUM MUCRONATUM* SUBSP. *ORIENTALE* (BOISS).

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Plant tissue culture systems represent a potential renewable source of valuable medicinal compounds, flavours, fragrances, and colorants, which cannot be produced by microbial cells or chemical synthesis [1]. The past two decades plant cell biotechnology has evolved as a promising new area within the field of biotechnology, focusing on the production of plant secondary metabolites [1, 2]. The present work describes the effects of explants (roots, hypocotyls and cotyledons), light, different kinds of cytokinins (Kinetin and BAP) and presence of auxin [2, 4- dichlorophenoxyacetic acid (2, 4-D)] on induction and growth of callus in *Linum mucronatum* subsp. *orientale* (Boiss). one medicinal plant. First of all, explant sections were cultured in different combinations of plant growth regulators, in dark or light for 30 days. After 30 days, calli diameter and fresh weight were evaluated. A factorial randomized design with 3 replicates was used for data analysis. When the effects of plant growth regulators on callus induction were investigated, it was revealed that in all explants light and dark condition not affected on callus induction and growth. The results also showed that callus induction and cell division were stimulated faster and better in kinetin (when combined with 2, 4-D). Dichloromethane extracts were obtained from in vitro cultured *L. mucronatum* and the lignins were detected by TLC.

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EFFECTS OF CATTLE MANURE, VERMICOMPOST AND HUMIC ACID ON GRAIN YIELD AND ITS COMPONENTS OF FENNEL (*FOENICULUM VULGARE* MILL.)

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To increase the crops quality especially medicinal and aromatic plants, organic fertilization is more acceptable than chemical fertilizers. To study the effects of different organic soil amendments on yield and yield components of fennel, a field experiment was carried out at College of Agriculture, University of Zanjan in the spring of 2012 (1). The experiment was conducted as a randomized complete block design with three replications. In this experiment the effect of different levels of organic fertilizer such as cattle manure, vermicompost and humic acid compared to controls were studied. Results showed that most traits including grain and biological yield, number of umbrella per plant, 1000-grain weight, number of umbellet in umbrella, number of seed in umbellet, number of seed in umbrella were significantly affected ($p \leq 0.05$) by different organic fertilizing treatments. Majority of mentioned traits were increased by application of organic fertilizers compared with control. Application of humic acid was less effective at improving fennel performance compared to cattle manure and vermicompost. So the highest grain (2530.45 kg/ ha) and biological yields (4899.9 kg/ha) were obtained by 30 ton/ha vermicompost and the lowest amounts of mentioned traits were obtained by control. It seems that application of organic fertilizers especially vermicompost, can considerably improve the performance of fennel (2).

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**ANTIOXIDANT ACTIVITY OF *MELISSA OFFICINALIS* LEAVES
EXTRACTS DURING THE DIFFERENT STAGES OF PLANT GROWTH**

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Plants rich source of phenolic compounds (phenolic acids, flavonoids and tannins) are the most important natural antioxidants. The *Melissa officinalis* has many valuable properties including antioxidant, anti-bacterial, analgesic, and relaxing. The purpose of this study was to determine change of antioxidant activity of plant leaves in various stages and the best harvest time of *M. officinalis* leaves for maximum antioxidant activity. Lemon balm leaves in three stages Different (vegetative growth stage, flowering and after of flowering stage) collected and was dried. The antioxidant capacity of the plant extract was done DPPH and FRAP assay. The results of DPPH and ferric reducing capacity in flowering stage were high. So it seems the best time to plant, harvest leaves for the operation of its antioxidant property is in August [1, 2].

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**ANTIBACTERIAL ACTIVITY OF HIDROALCOHOLIC EXTRACT
AND BUTANOL FRACTION OF SOLANUM NIGRUM L. LEAVES**

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The chemical constituents of plants play an important role in proper replacement of chemical drugs. This study was carried out to evaluate the antibacterial effect of hydroalcoholic extract and *n*-butanol fraction of *Solanum nigrum*. *S. nigrum* from Solanaceae family is one of the important traditional herbal plant that has showed medicinal properties such as anticancer, antioxidant, antipyretic and neuroprotective activities [1, 2]. Antimicrobial assay was evaluated using broth microdilution on *Escherichia coli* PTCC 1330, *Staphylococcus aureus* PTTC 1112 and *Micrococcus luteus* PTCC 1110. The results indicated that leaf extract and *n*-butanol fraction of *S. nigrum* had no activity against *M. luteus* and *E. coli* in tested concentrations. The minimum inhibitory concentration (MIC) of extract was 800 µg/mL for *S. aureus* and in this concentration had bacteriostatic effect. However *n*-butanol fraction had no effect against *S. aureus*. Screening among natural resources and plants, which are used in folk medicine can be benefit. This study demonstrated that *S. nigrum* inhibited the growth of *S. aureus* in vitro.

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**MICROWAVE-ASSISTED AND CONVENTIONAL
HYDRODISTILLATION METHODS IN THE EXTRACTION OF
ESSENTIAL OIL FROM *ACHILLEA SANTOLINA***

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Microwave-assisted hydrodistillation (MAHD) at three levels of microwave power (300,500, and 700 W) and the traditional hydrodistillation (HD) were applied to obtain essential oils from *Achillea santolina*. MAHD offers important advantages over HD in terms of energy savings and extraction time (20 min against 4 h). The composition of the extracted essential oils was investigated by GC-FID and GC-MS. 1, 8-cineole (13.68% and 24.58%), Chrysanthonone (6.97 and 12.99), Camphor (9.13% and 10.92%) and α -Terpineol (3.42% and 9.58%) were the major compounds that obtained by HD and MAHD, respectively. All these results suggest that SFME represents an excellent alternative protocol for production of essential oils from plant materials.



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**ETHNOPHARMACOLOGY AND ANTIOXIDANT ACTIVITY OF
THYMUS KOTSCHYANUS BOISS. ET HOHEN. IN NORTH OF IRAN**

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Thymus kotschyanus (Lamiaceae) with locally known as " Avishan kuchi" is one of the most important Mountainous medicinal plants in North of Iran, which has been used by the rural healers to prevent and treat of various diseases. The main aims of research were evaluation of ethnopharmacology and antioxidant activity of *Thymus kotschyanus Boiss. et Hohen.* In this study aerial part of plant in blooming were collected of Chahar Bagh Mountainous region in Golestan province (2000m), then dried and was extracted by methanol solvent. In ethnopharmacological study, the famous rural healers (50-60 years old) were identified and in many field observation, the most traditional information such as ecological equipments, part used and its effects were obtained. antioxidant activity was measured by tree methods: Total Antioxidant Capacity (TAC), 1,1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH), and Reducing Power (RP). Ethnopharmacological results showed that this plant in single or combination with other plants has been used in traditional medicine of this region as anti-inflammation, anti-dyspepsia, anti-spasmodic, sedative and anti infection. Antioxidant Activity (IC₅₀) was measured 253.64 mg/ml for DPPH, 475.66 mg/ml in RP methods and with high quantities (517.84 mg/ml) in TAC method. Therefore, these obtains could provide natural sources of antioxidant compounds to treatment of disorders associated with free radicals for future research.



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NATIONAL PRODUCTION AND PROCREATION OF MEDICINAL
AND ORGANIC PLANT "*KELUSSIA ODORATISSIMA*" AND ITS
ECONOMIC CONSEQUENCES

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Kelussia odoratissima Mozaff, is a new perennial species of the *Kelussia* genus and Apiaceae family. This plant has four wide habitat; Isfahan, Chahar Mahal Bakhtiari, Kohkiloye Boyer Ahmad and Lorestan. *Kelussia* is grown organically and organically and seen at high altitudes so it mentioned "snow baby". Period of Completion annual growth, depending on regional climate, is early May until the middle of June. Because of the limited duration of growth and the short time of live biomass, procreation such as drying for greater durability is necessary. Since farming has always a risk of failure, in contrast, in procreation, there is no any risk of financial loss. Organic production, with no risk of cultivate and use of any Fertilizers and pesticides, are sold 10 to 1 ratio against cultivated products in the world because of safety. In this study, introduce a practical and scientific processing of *Kelussia* in the form of spices and pickles, Ordered by the Department of Natural Resources in Isfahan Province to be privatized, and as a good pattern, create alternative income for the local people instead of agriculture and animal husbandry in the region and the wider area for graduates seeking work (private sector). Results showed that with the purchase of 2500 kg of fresh *Kelussia* from locals, produced 357 kg of dry powder in automation method with health code approved by the Food and Drug Administration in factory, from this value Produced 207 kg dried leaves, 150 Kg of dried stem in two colors and two different mesh size powders according to consumer demand. Other woody stems of *Kelussia*, 5 cm in diameter, also became Vacuumed pack or jar of pickles in number of 2600. This aspect of national production created jobs for 25 people within two months. It is calculated without regard to the marketing labor of products.



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COMPARISON OF TOTAL PHENOLIC CONTENT AND ANTI-
OXIDANT ACTIVITY OF *ACHILLEA NOBILIS*, *A. FILIPENDULINA*
AND *A. MILLEFOLIUM*

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Bioactive compounds such as phenolics and essential oils involved in medicinal plants are to be beneficial for human health. Medicinal plants are potential sources of natural antioxidants [3]. Yarrow (*Achillea* L.) is one of the valuable genera of Asteraceae family [2]. This plant has many medicinal and pharmaceutical applications because of its antioxidant properties. In this research, Total phenolic content and antioxidant activity of the methanolic extracts of three *Achillea* species (*A. nobilis*, *A. filipendulina* and *A. millefolium*) were compared; using Folin-Ciocalteu method and 1, 1-diphenyl-2-picrylhydrazyl (DPPH) assay [1]. The DPPH scavenging ability of the extracts may be attributed to its hydrogen donating ability that probably shows the role of phenols existing in the extracts. A high level of phenolic content variation was observed among species. *A. millefolium* and *A. filipendulina* with 47.2 and 22.33mg Tannic acid/g dry weight (DW) had the highest and lowest total phenolic content, respectively; but *A. nobilis* was very similar to *A. millefolium* with 44.7mg Tannic acid/g DW. These species (*A. nobilis* and *A. millefolium*) are very similar in respect to their systematic classification. In DPPH assay *A. millefolium*, *A. filipendulina* and *A. nobilis* possessed 1561, 340 and 310 μ g/ml, respectively. The preliminary chemical examination of the extracts has demonstrated the presence of phenols and flavonoids, which may be responsible of the antioxidant activities. The high scavenging property of *A. nobilis* may be due to hydroxyl groups existing in the phenolic compounds which can scavenge free radicals. The results showed that the three studied species of *Achillea* had remarkable phenolic content and acceptable antioxidant activity level. So, they can be introduced as a good source of natural antioxidants for pharmaceutical, medical and food purposes.

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**EFFECT OF FOLIAR SALICYLIC ACID AND CYCOCEL
APPLICATIONS ON SOME PHYSIOLOGICAL PARAMETERS OF
SWEET BASIL**

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Ocimum species are used in traditional Iranian medicine, as a culinary herb, and as a well-known source of flavoring principles. This study was conducted to determine the effect of foliar salicylic acid (SA) and cycocel (CCC) applications on photosynthetic pigments (chlorophyll a, b, total and carotenoids), free proline and total soluble protein contents of sweet basil (*Ocimum basilicum* L.) under greenhouse conditions. Basil plants were treated with foliar SA, cycocel and combination of these two plant growth regulators applications at different concentrations (SA with 0, 75 and 150 mg/L and cycocel with 0, 500 and 1000 mg/L). Treatments were applied with spraying five times during the vegetation at 7-day intervals one week after planting. Control plants were sprayed with deionized water. In the study, it was determined that foliar applications of SA and cycocel showed significant effect ($P \leq 0.05$) on above-mentioned physiological parameters in shoots of basil. The greatest effects were obtained from combination treatment of SA (75 mg/L) along with cycocel (1000 mg/L). According to our results, applications of 75 mg/L SA and 1000 mg/L cycocel in combination should be recommended in order to improve growth of basil.

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**FOLIAR APPLICATION OF SALICYLIC ACID AND CYCOCEL
IMPROVED PHYSIOLOGICAL PARAMETERS IN DRAGONHEAD**

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Dragonhead (*Dracocephalum moldavica* L., Lamiaceae) has been traditionally used as a cardiotoxic agent in the folk medicine of some regions of Iran. This study was done to evaluate effects of foliar salicylic acid (SA) and cycocel (CCC) applications on photosynthetic pigments (chlorophyll a, b, total and carotenoids), free proline and total soluble protein contents of dragonhead under greenhouse conditions. Dragonhead plants were treated with foliar SA, cycocel and combination of these two plant growth regulators applications at different concentrations (SA with 0, 75 and 150 mg/L and cycocel with 0, 500 and 1000 mg/L). Treatments were applied with spraying five times during the vegetation at 7-day intervals one week after planting. Control plants were sprayed with deionized water. Results showed that the effects of plant growth regulators SA and cycocel on photosynthetic pigments concentrations and free proline and total protein contents were significant ($P \leq 0.05$). The highest effects occurred in combination treatment of SA (75 mg/L) along with cycocel (500 mg/L). It was concluded that foliar spray of 75 mg/L SA and 500 mg/L cycocel in combination might be employed for enhancing the vegetative growth in dragonhead.

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**INTRODUCTION OF *ACHILLEA KELLALENSIS* AS A NEW SOURCE
OF NATURAL ANTIOXIDANT**

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In recent years, the interest in natural antioxidants and radical scavenging properties of medicinal herbs and their extracts has been arised enormously. In fact, the antioxidants contained in plants seem to be involved in the preservation of human health, e.g. by preventing cancer, slowing down the aging process and reducing the risk of cardiovascular and neurodegenerative diseases. *Achillea*, as one of the most important genera of the Compositae (Asteraceae) family, comprises more than 100 species around the world, mainly distributed in Europe, Asia and North Africa [3]. Nineteen species were recognized in Iran in which *A. kellalensis* is considered as the endemic one. There are no reports regarding its antioxidant activity and prolin content. In this research, total phenolic, prolin content and antioxidant activity of the methanolic extract of *A. kellalensis* was evaluated; Proline colorimetric determination proceeded according to Bates method [1]; based on proline's reaction with ninhydrin, phenolic content by Folin-Ciocalteu method and 1, 1-diphenyl-2-picrylhydrazy (DPPH), ferric thiocyanate (FTC) and β -carotene-linoleic acid assay, were used for antioxidant activity [2,4]. *A. kellalensis* possessed 30.07mg Tannic acid/g dry weight (DW) that is the noticeable amount of phenolic content for this endemic species. Prolin content in this species was obtained 8.17mg/g Dw. According to FTC, absorbance in 700 nm was 1.49 which was higher than BHT (1.18) as a synthetic antioxidant. β -carotene was also confirmed the FTC model system in which the inhibition was 8.14% which was higher than BHT (6.97%). In conclusion, *A. kellalensis* can be introduced as a new endemic plant which possessed acceptable natural antioxidants.

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**THE EFFECTS OF HYDROALCOHOLIC EXTRACT OF GARLIC ON
SERUM LEVELS OF NO IN MALE RATS**

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Although there are ample reports indicating the effects of garlic on various body systems [1-3], few information is available about the effects of garlic on physiological functions, in particular NO. The purpose of this study was to determine the effects of hydroalcoholic extract of garlic on serum levels of NO in male rats. In this study, male Wistar rats were randomly divided into control, normal saline receiving, garlic extract (100 mg/kg/body weight) receiving animals of 5 rats in each group. Garlic extract was daily injected intraperitoneally for 7 days. Blood samples were collected using cardiac puncture method and serum NO level was measured using spectrophotometry method. Data were statistically analyzed and compared between groups using ANOVA. Serum NO level was not significantly changed in normal saline receiving rats compared with control animals; however, it was significantly increased in garlic receiving animals compared to control rats. Our finding clearly indicates that hydroalcoholic extract of garlic can influence NO secretion to blood resulting in enhanced serum level of NO.

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**A COMPARISON OF α -TOCOPHEROL CONTENT OF
LAURUS NOBILIS LEAVES IN DIFFERENT HARVESTING SEASON
(SPRING & FALL) BY REVERSE-PHASE HIGH PERFORMANCE
LIQUID CHROMATOGRAPHY (RP-HPLC)**

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Laurus nobilis (bay) is a plant that has a spicy fragrance and flavor, and the leaves are traditionally used in all types of cooking, probably due to not only their flavor but also as home remedy for some diseases. The present work includes a comparison of α -tocopherols content of Iranian *Laurus nobilis* leaves ethanolic extracted either of spring harvested or fall harvested leaves, and for this purpose α -tocopherols contents of *Laurus nobilis* leaf various extracts were screened by reversed-phase high performance liquid chromatography (RP-HPLC) with UV detection. The results showed significant variations in the amounts of leaf α -tocopherols in two different harvesting seasons, The spring harvesting leaf contained the higher amount of α -tocopherol (1594.62 mg /100g dry weight), than the fall harvesting leaf (377.019 mg/100 g dry herb). These findings suggest that the spring harvesting leaf of *Laurus nobilis* may be a better source of natural α -tocopherol than fall harvesting leaf and that it may be increasingly important for human consumption, as well as for the agro-food, cosmetic and pharmaceutical industries.

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YIELD AND YIELD COMPONENTS OF FENNEL (*FOENICULUM VULGAR* MILL.) IN RESPONSE TO FOLIAR APPLICATION OF MICRONUTRIENTS (IRON AND ZINC)

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Foliar application of fertilizers is a particularly useful technique designed to meet plants specific needs for one or more micro or macro nutrients especially trace minerals. In order to evaluate the effect of foliar application of micronutrients (iron and zinc) on yield and yield components of fennel, a field experiment was carried out at the Research Farm of Faculty of Agriculture, University of Zanjan in the spring of 2012. The experiment was arranged as factorial based on randomized complete block design with three replications. The treatments were foliar application of Fe (using ferrous sulphate) in four concentrations (0, 0.1, 0.2 and 0.3%) and foliar application of Zn (using zinc sulphate) in three concentrations (0, 0.2 and 0.4%). Results showed that most traits were significantly ($p \leq 0.05$) affected by foliar application of micronutrients. The majority of measured traits included grain yield, number of umbrella per plant, 1000-seed weight, number of umbellet in umbrella, number of seed in umbellet, number of seed in umbrella were increased by foliar application of Fe and Zn, compared with control (untreated). So the highest grain yield (3775 kg ha^{-1}) was obtained in foliar application of Fe+Zn with a concentration of 0.2% and the lowest grain yield was obtained in control. It seems that foliar application of iron and zinc can considerably improve the performance of fennel.



**EFFECT OF MAGNETIC FIELD AND NANO-PARTICLES OF
TITANIUM OXIDE (TiO₂) ON SEED GERMINATION AND EARLY
GROWTH CHARACTERISTICS OF AJOWAN (*AMMI COPTICUM* L.)
IN PREMATURE SENESCENCE**

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High temperature and relative humidity during seed storage make rapid decline in seed germination and quality. Some physical and chemical pre-treatments in these condition, can improve the seed quality and characteristics. Use of magnetic field and pre-treatment of seeds with nano-particles are two treatments which examined in our study to investigate their effects on seed germination and early growth characteristics of Ajowan (*Ammi copticum* L.) in premature senescence condition. An experiment with factorial arrangement based on completely randomized design with 3 replications was conducted in research laboratory of Birjand University in 2012. Seed deterioration was induced by storage in temperature of 40°C and saturation condition for 48 h. The first factor was priming with nano-particles of titanium oxide (TiO₂) at two levels (0 (control) and 200 ppm), the second factor was using of the magnetic field at three levels (50, 100 and 200 mT) and the third factor was the time when seed exposed to magnetic field at three levels (30, 60 and 120 minutes). Two control treatments (without any of the seed treatments and treat just with nano-priming) were considered. Results showed that priming with nano-particles of TiO₂ had significant effect on improving of germination rate, seedling length and seedling fresh weight of Ajowan in deterioration condition. Use of magnetic field could affect seedling fresh weight (p<0.05). Interaction effect magnetic field and nano-priming was significant (p<0.01) on all measured traits. Result indicated that seeds which induced by 50 mT of magnetic field for duration of 120 minutes, had the most seedling length and least electrolyte leakage.

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**ANALGESIC EFFECT OF *HYPERICUM PERFORATUM* EXTRACT IN
RAT BY USING HOT PLATE TEST**

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Hypericum perforatum is one of the most widely used herbs in the world for treating of mild to moderate depression. Several species of this genus has known that the most important of them is *H.perforatum*. The aim of this study was to investigate the analgesic effect of this plant extract on hot plate test model that use as an experimental model of acute thermal pain. Materials and Methods: Wistar rats' weights were 225-250 g in this research. For evaluating the acute pain, hot plate device with $50^{\circ}\pm 1$ temperature was used to determine the time at which, the test stopped licking limbs was 60 seconds and jumping time was 4 minutes. Analgesic effect of the plant extract at doses of 250 and 500 mg per kg body weight through gavage were examined. The recent study showed that 250 mg/kg.bw dose of *Hypericum perforatum* significantly increased (6.32 ± 23.20) the pain threshold that appearance by hands and feet licking, compared to the control group (0.91 ± 10.33) and 500 mg / kg.bw dose of *Hypericum perforatum* (2.13 ± 10.20), ($p \leq 0.05$). Between the three groups, levels 250 and 500 mg / kg.bw *Hypericum perforatum* not observed a significant difference in terms of jumping time (respectively: 14.56 ± 57.83 , 9.72 ± 46.83 and 9.13 ± 42.00) ($p > 0.05$).
Keywords: *Hypericum Perforatum*, Anti pain, Hot plate test

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**USING SOME ESSENTIAL OILS IN THE CONTROL OF BACTERIAL
CANKER DISEASE OF STONE FRUIT**

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Essential oils are complex volatile compounds that some of them are known to have antimicrobial effects that compared to chemical pesticides are less harmful to human health and the environment. The aim of this study was to investigate the antibacterial activity of the essential oils of shallots, *Muscari comosum*, *Foeniculum vulgare*, *Dorema ammoniacum*, *Ferula assa-foetida*, *Thymus vulgaris*, *Cupressus arizonica*, *Mentha piperita* and *Heracleum persicum* on *Pseudomonas syringae* pv. *Syringae* That is an important bacterium in plant pathology because of its wide host range on plants, including *Stone fruit trees*. Antibacterial effects of the mentioned essential oils at concentrations of 0.1 to 0.001 the experiment was determined using paper disc on 6 cm petri dishes and then Minimum bactericidal concentration was described. According to the results of this experiment, the essential oils of *Thymus vulgaris* and *Muscari comosum* showed the most antibacterial activity and can claim that the appropriate formulation of those can be used as a substitution for antibiotic and copper containing bactericides for controlling the related disease.

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**The EFFECT OF DROUGHT STRESS ON TOTAL PHENOLIC, PROLIN
CONTENT AND ANTIOXIDANT ACTIVITY OF
ACHILLEA MILLEFOLIUM L.**

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Oxidative stress is initiated by reactive oxygen species (ROS), such as superoxide anion (O_2^-), perhydroxy radical ($HOO\bullet$) and hydroxyl radical ($HO\bullet$). These radicals are formed by one electron reduction process of molecular oxygen (O_2) [2, 3]. Most living species have efficient defense system to prevent themselves against oxidative stress induced by ROS. Antioxidants are important compounds which possess the ability of protecting organisms from damage caused by free radicals-induced oxidative stress [1]. The antioxidant activity of phenolics is mainly due to their redox properties, which allow them to act as reducing agents, hydrogen donors, singlet oxygen quenchers and metal chelators. Drought stress might induce the production of phenolics and prolin as well as their antioxidant activity, but it can be variable among different plant species. *Achillea millefolium* L. is the best-known species of the genus *Achillea* due to numerous medicinal applications both in folk and conventional medicine. Phenolic compounds such as flavonoids and phenolic acids are present in yarrow and constitute one of the most important groups of pharmacologically active substances [4]. In the present study, four drought stress treatments in three replicate were applied to assess phenolic content, prolin and antioxidant activity changes in *A. millefolium*. The drought treatments were 25%, 50%, 75% FC (Field capacity) and control (100%FC). Phenolic content was evaluated using Folin-Ciocalteu method. Antioxidant activity was calculated according to three model systems including 1, 1-diphenyl-2-picrylhydrazyl (DPPH), ferric thiocyanate (FTC) and β -carotene-linoleic acid assay. The results showed that phenolic content was variable in different drought stress treatments from 19.75 in control to 30.24mg Tannic acid/g dry weight (DW) in 25% FC. In DPPH assay, the inhibition percent increased from 40.45% (in control) to 69.1% (in 25% FC), while in β -carotene model system inhibition percentage varied from 5.45 (in control) to 20.1% (in 25% FC). In FTC model system the absorbance in 700nm was also elevated from 1.21 (in control) to 1.505 in 25%FC. Prolin content was also affected by drought stress and varied from 5.06 to 7.925mg/g in treatments of 100% and 25% FC, respectively. Finally, results indicated that under drought stress, phenolic content was elevated by higher rate in comparison with prolin content and antioxidant activity. So, it might be concluded that in *A. millefolium*, drought stress could be beneficial to increase secondary metabolites for pharmaceutical purposes.



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**FORMULATION OF THE HORSE CHESTNUT EMULGEL FOR
CHRONIC VENOUS INSUFFICIENCY**

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Chronic Venous Insufficiency is kind of continuum of circulatory disease which has been indicated with the skin changes in the lower leg that commonly occur include discoloration, eczema, scarring or hard, thickened skin, and ulceration. A number of clinical studies have shown that horse- chestnut seed extract may be useful for patients with mild to moderate chronic venous insufficiency. Emulgel (Emulsion in gel) has emerged as one of the useful semisolid drug systems as has been improved the stability of emulsion by incorporating in a gel matrix. The aim of this study was to achieve a suitable formulation of Jellified emulsion containing Horse chestnut extract for treatment of CVI. Horse chestnut extract, which was purchased from Indian LEPRO Company, incorporated and standardized base on DAB 10. Calendula extract was obtained by BP methods. Subsequently, in suitable oil in water emulsion base, herbal extract and gel phase have been added. Physico-chemical tests such as creaming, coalescence, thermal test, pH changing, centrifugal test, viscosity, spread ability, cooling and heating test and content uniformity were determined. Achieved results of study showed that using of appropriate amount of sorbitan monostearate and gel factor had interesting effect on stability of system. Most of formulations had acceptable physicochemical characteristics and stability parameters except No.1, No.4, and No.5. The results of studied revealed that emulgel systems are a perfect choice for preparing tropical cream with herbal extract when unknown effect of herbal elements will be taken place.



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EVALUATION OF ANTIOXIDANT ACTIVITY OF ETHANOLIC AND
METHANOLIC EXTRACTS OF PURSLANE SEEDS

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Portulaca oleracea (Portulacaceae family) is listed in the World Health Organization as one of the most used medicinal plants and it has been given the term 'Global Panacea [1]. Plants, including herbs and spices, have many phytochemicals which are potential sources of natural antioxidants, e.g. diterpenes, flavonoids, tannins and phenolic acids [3]. Today there is an increasing interest in the use of natural antioxidants, because these natural antioxidants avoid undesired health problems that may arise from the use of synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) which may have toxic effects [2]. The aim of this work is the antioxidant capacity assessment of methanolic and ethanolic extracts of purslane seeds. Ground purslane seeds were blended with ratio of 1:4 (w/v) with 80% methanol or ethanol aqueous solution at room temperature for 24 hours in the dark. Then solvent was evaporated with rotary evaporator. The antioxidant capacity was determined using DPPH (2, 2- diphenyl-1- picrylhydrazyl) assay. The total phenolics content determined as Folin–Ciocalteu method. The experiments were conducted in triplicate and statistical analysis of the data was performed by analysis of variance (ANOVA) using SPSS systems. The differences between individual means were deemed to be significant at $p < 0.05$. The methanolic extract of purslane seeds had a higher antioxidant activity than ethanolic extract. Also in the both extracts antioxidant activity increased with increasing concentration. The inhibition concentration IC_{50} for ethanolic and methanolic extracts and BHT were 418/13, 346/47 and 8/08 mg/ml, respectively. On the basis of the results, purslane can be used as easily accessible source of natural antioxidants and as a possible food supplement or in pharmaceutical applications.

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**THE EFFECT OF DRYING METHODS ON YIELD AND CHEMICAL
COMPOSITION OF THE ESSENTIAL OIL OF *ROSA FOETIDA***

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Rosa foetida Hermann (Rosaceae) is a dense shrub with bright yellow and aromatic flowers which is mainly growing in the mountainous North and West regions of Iran [1]. The objective of this study was to investigate the effect of drying treatments on yield and chemical composition of the essential oil of *R. foetida* incorporation into a post harvesting program for medicinal and perfumery industries. The petals of *R. foetida* were collected at floral budding stage from Shekar-nab village (36° 14' N, 50° 24' E at an altitude of 1970 m), Qazvin Province, Iran. The drying methods tested were sun-drying (SD, 32 h under sunlight), shade-drying (SHD, 72 h under shade condition in a closed place), oven-drying (OD1, 22 h heated at 40 and OD2 18 h heated at 60° C) and microwave-drying (MD1, 17 min irradiated with energy of 340W and MD2, 11 min irradiated with energy of 510W). The essential oils from fresh and dried samples were isolated by hydrodistillation and analyzed by GC-FID and GC/MS [2, 3]. The drying method had a significant effect on the essential oil content (w/w %) and was in the order of: SHD (0.28%)> MD1 (0.25%)> SD (0.20%)> OD1 (0.18%)> OD2 (0.14%)> MD2 (0.05%). In total, 9, 14, 11, 10, 11 and 13 constituents were identified and quantified in SD, SHD, OD1, OD2, MD1 and MD2 methods, representing 97.4, 97.6, 96.4, 96.2, 96.5 and 92.9 % of the total oil, respectively. The main components were aliphatic hydrocarbons *n*-nonadecane (38.3-56.4%), *n*-hexadecanol (15.8-19.7%), *n*-heneicosane (15.5-22.3%), *n*-tetradecanol (1.5-5.1%) and 2-pentadecanone (1.3-2.6%) in the essential oil of all dried samples.

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**ALTERATIONS IN SEED VIGOR AND ANTIOXIDANT ENZYMES
ACTIVITIES IN *SATUREJA HORTENSIS* L. UNDER SEED PRIMING**

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In seed priming, seeds are partially hydrated to a point where germination processes commence but radical emergence does not occur [1]. Seeds with higher antioxidant profiles are more tolerant to unsuitable conditions than other seeds. This study was conducted to evaluate the influence of the seed priming technique on seed performance during germination and on antioxidant activity of *S. hortensis* seeds. The seeds were invigorated by traditional soaking (hydropriming at 25°C for 6 hours) and hormonal priming by using ascorbic acid (soaking in 10 and 20 Mm solutions at 25°C for 6 hours). Results indicated that priming increased germination percentage, seed vigor index, germination rate and shortened MGT than non-primed. The highest germination percentage, seedling dry weight, seedling vigour index and plumule length was recorded in hydropriming. Moreover, priming also enhanced the anti-oxidative enzymes of peroxidase (POX) and catalase (CAT) level of treated seeds. Activity of POX and CAT was higher in hydropriming than hormonal priming. Generally, the results indicated that hydropriming could improve seed and seedlings parameters of *S. hortensis*.

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**EFFECT OF *ACHILLEA MILLEFOLIUM* L. AERIAL PARTS ON
SERUM GLUCOSE IN ALLOXAN-INDUCED DIABETIC RATS**

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Achillea millefolium is a well-known species amongst the members of *Achillea* (Asteraceae). The aerial parts of different species of the genus *Achillea* L., including *Achillea millefolium* L. (yarrow), are widely used in folk medicine due to numerous pharmacological properties, such as anti-inflammatory, antioxidant, antispasmodic, stomachic and antiseptic [1, 2]. To determine the hypoglycaemic effect of sage leaves, we investigated the effects of ethanolic extract of aerial parts of yarrow on alloxan-induced diabetic rats. The animals were made diabetic using by alloxan (150 mg/kg, i.p.). The ethanolic extract (10, 50, 100 and 200 mg/kg) was injected orally for 28 days. The control groups were administered water as vehicle of ethanolic extract. Blood samples were obtained from heart. The serum glucose was measured by the enzymatic method of glucose oxidase. The results showed that the ethanolic extract of yarrow significantly decreased serum glucose in diabetic rats. The present data indicate that yarrow extract has hypoglycaemic effect on diabetic animals and the plant should be considered in future therapeutic researches.

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**EFFECT OF GROWTH MEDIA ON THE VEGETATIVE
CHARACTERISTICS, PHYSIOLOGICAL PARAMETERS AND OIL
PRODUCTION OF VALERIAN**

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Production of medicinal plants to meet the ever increasing demand for these plants requires approaches that can enhance the yield along with maintaining or improving the quality of the product. Growing of medicinal and aromatic plants in controlled environment specially hydroponic systems provides an opportunity for improving biomass production with the high quality of herbs and root materials free from accidental adulteration by weeds, pathogens and soil or environment toxins. (1, 2) off-season production, adjustable availability of nutrient solution and minimized use of water are advantages of production of medicinal plants in this systems compared with conventional soil –based cultivation. Furthermore in these systems the losses of product will be reduced specially in root medicinal plants. In this experiment the growth and essential oil production of valerian (*valeriana officinalis* L) grown in soil, floating, aeroponic and aggregate media were evaluated by measuring the vegetative characteristics (fresh and dry weight of leaves and roots, leaf area, root volume), physiological parameters (chlorophyll index, photosynthesis, stomatal conductance) and essential oil content and concentration. Highest fresh weight of both leaves and roots were observed in floating system. The highest and lowest percentage of dry matter was observed in soil media and floating system representing 11.83 and 9.76% of total weight respectively. There were no significant difference in leaf area between the aeroponic and soli systems, but it has a drastic increase in floating and aggregate systems. Plants growing in all hydroponic systems showed more chlorophyll index compared with soil grown ones. For all physiological parameters including photosynthesis, stomatal conductance and transpiration plants growing in all hydroponic systems had more values compared to soil grown ones. Highest concentration (% of dry weight) and content (per plant) of essential oil were observed in floating system. There was no significant difference between other systems for essential oil concentration of plants while for oil content, plants growing in aeroponic and aggregate media showed more total essential oil production than soil grown ones as the result of more biomass production in these two systems. It can be concluded that hydroponic systems can be an appropriate techniques for production of valerian plant and floating system is capable of equivalent and superior yield compared with soil- based production.

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**INTRODUCING SOME DISEASES AGENTS OF THYME PLANTS IN
HAMADAN PROVINCE OF IRAN**

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Thyme (*Thymus* spp.) is one of the medicinal and aromatic plants that growing in temperate zones, especially in Hamadan province. *Thymus* species growing in Hamadan climate including; *T. daenensis*, *T. fallax*, *T. kotschyanus*, *T. pubescens*, *T. migricus* and *T. Eriocalyx*. During 2008-2010, thyme plant distribution areas were visited periodically every 15days. Leaves and stems diseased samples were collected and transported to the RIFR laboratory and identified. Powdery Mildew; *Golovinomyces biocellatus* was collected on *T. daenensis*, *T. fallax* species, Thyme rust; *Puccinia serpylli* was found only on *T. daenensis* and Dodder; *Cuscuta aproximata* was collected on *T. daenensis* and *T. fallax*.species in rangelands of province.

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DORMANCY BREAKING OF IMPERIAL CROWN SEEDS

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Imperial Crown (*Fritillaria imperialis*) is a Perennial plant has a high medicinal and ornamental value and importance. The crude drug comprising ‘‘Fritillariae bulbs’’ has been long used as a principal Chinese medicine, possess blood platelet aggregation inhibitory activity and used for the treatment of various ailments such as sore throat, cough, asthma, bronchitis, scrofula, gland tumor, dysuria and haemoptysis in folklore. Beside its anti-tussive, expectorant and anti-hypertensive attributes, it attracts many tourists from all over the world to see the Crown Imperial in the wild [1]. In Iran, wild populations of *F. imperialis* are at risk of rapid eradication, because of irregular grazing of *Fritillaria* stands, lack of protecting rules, changing the pastures to dry farmlands, and pest overflow. Therefore, the preservation, protection and regeneration of this valuable plant are quite important [2]. Naturally, Imperial Crown regenerates from bulbs. Another option is the seed. Because of high numbers of offspring, small size and so fine dispersal to colonization of new areas and having good potential to withstand a much wider range of environmental constraints versus bulbs, so they are a fine tool to multiplication of Imperial Crown [3]. The seeds of *Fritillaria* are dormant, this however has evolutionary, and survival benefits for the plant but restrict its germination. Therefore, we decided to break the dormancy and introduce the seeds as a new regeneration tool. Then this study was aimed to evaluate different methods of seeds dormancy break of Imperial Crown collected from Dashte-Lale in Zagros Mountain in Iran. Different dormancy break treatments and methods like mechanical and chemical scarification, leaching, hot water, cold and warm stratification, freezing and KNO_3 were performed at different levels for seeds. Just freezing -20°C improved seed germination by only 5% but cold stratification of seeds for 10 weeks in 4°C resulted to complete germination. Dormancy released seed of Imperial Crown may used to regeneration of this valuable plant for medicinal or ornamental purposes.

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**ESTIMATION OF MILK THISTLE SEED SILYBIN BY USING OF
MULTIPLE REGRESSION MODELS**

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Seeds of milk thistle (*Silybum marianum* (L.) Gaernt) contain flavonolignan compounds that have interesting and important therapeutic activities. Silybin is the most important flavonolignan derived from milk thistle, has been shown to have antioxidative and anti-inflammatory properties. In order to estimation of milk thistle seed silybin percent under salinity stress, a pot experiment was carried out on milk thistle Ahvaz wild genotype in the form of completely randomized design with six treatments and three replications. Salinity treatments included (1.09, 3,6,9,12,15 dS/m). Multiple regression models (polynomial, sigmoidal, peak, power) were evaluated and based on coefficient of determination, root mean square error and standard error estimation of model, the best regression model was selected. Result showed that four-parameter sigmoidal regression with determination coefficient 99.9 was the best regression model. $Silybin\% = 0.233 + 0.556 / (1 + \exp(-(\text{salinity level} - 6.066) / 1.112))$. Consideration to sigmoidal trend, with increasing salinity of 9 dS/m, silybin percent increased and then became constant. As a result, for producing valuable medicinal and edible seeds of milk thistle, this plant can be cultivated in soils with moderate salinity of 9 dS m.

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**ESTIMATION OF ACTIVE SUBSTANCES CONTENTS OF MILK
THISTLE BY USING STEPWISE REGRESSION**

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The fruit of the milk thistle (*Silybum marianum* Gaertn.) contains an isomeric mixture of flavonolignans known collectively as silymarin. Silymarin is used to treatment of toxic liver damage, inflammatory liver diseases and liver cirrhosis and for their anticancer and chemopreventive effects. Pot experiment done in a factorial based on completely randomized design with six salinity level (1.09,3,6,9,12,15 dS/m) and three replications on two milk thistle genotypes (Ahvaz wild type and Germany). The seeds weight per capitulum, seeds number per capitulum, capitulum number per plant, main capitulum diameter, thousands seeds weight, number and weight of main stem seeds and number and weight of lateral stems seeds evaluated. Stepwise regression method was used to estimate the percentage of milk thistle oil. Results expressed that thousands seeds weight ($R^2= 75.43\%$) showed the best estimation from the active substances seed in Ahvaz genotype. In German genotype, weight seed of main stem ($R^2= 97.26\%$) showed the best estimation. Silymarin content (Ahvaz genotype) = $254.358-(2.51305 \times (\text{thousands seeds weight}))$, Silymarin content (Germany genotype) = $284.24311-(31.44759 \times (\text{main stem seed weight}))$. According to the results of this study can be expressed that the silymarin had higher dependent to seed size at both genotype and according to the significant negative correlation this two traits, the smaller and more seeds produced substances that are more active.

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**KARYOTYPE STUDY OF FOUR *CAPSICUM ANUUM* L. POPULATION,
NATIVE TO IRAN**

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To investigate the karyotype of *Capsicum anuum* L, the seeds of four of plant population were collected from different regions in Iran, and were identified. The obtained results from the karyologic studies of the root tips samples showed that the chromosome base no. in all the considered populations was $X=12$ and the no. of chromosomes were $2n=2X=24$. According to Stebbin's table, 3 populations were placed in class "2B" and one population was placed in class "2A". This indicated the chromosome asymmetry among the populations. Karyotype specific correlation coefficients showed that the total percentage form (TF %) has positive and significant correlation with the form percentage (F%), also showed a negative and significant correlation with the trait of "AR". Factor analysis provided two factors that justified nearly 90 percent of the total variations between the populations. For the first factor, the total percentage form and the form percentage had the greatest role in creating variations in the populations. For the 2nd factor, the difference of relative length had a great importance for the variance between the populations. In cluster breakdown, the considered populations were categorized into 2 groups by dandrogram sectioning at the distance of 48.58.

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CELL SUSPENSION CULTURE ESTABLISHMENT OF *TAXUS BACCATA* FOR THE PRODUCTION OF THE ANTICANCER DRUG TAXOL

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Among secondary metabolites with anticancer activity, taxol, a complex diterpene obtained from *Taxus* species is arguably the most important. Nevertheless, the total market for taxol remains well above \$1 billion per year and continues to expand, with new clinical uses anticipated [1]. In the present study, an efficient protocol has been performed for establishment of *Taxus baccata* cell suspension culture in shake flasks, as a strategy to obtain an *in vitro* taxol producing cell line. Callus culture was initiated from nodal segments on B5 [2] medium containing basic salts and 30 g/L sucrose supplemented with different plant hormone regimes [3] with some modification. High percentage of friable callus was obtained in nodal segments horizontally cultured on B5 medium supplemented with 3 mg L⁻¹ 2,4-D, 0.5 mg L⁻¹ Kin and 0.5 mg L⁻¹ GA. Cell suspension culture was established on the medium supplemented with NAA (2.0 mg L⁻¹) and BAP (0.1 mg L⁻¹) [4]. The growth kinetics of the cell suspension culture followed a general growth pattern of sigmoid curve and has shown a maximum specific cell growth rate of 0.10g day⁻¹, doubling time of 12 day and cell viability of 80%, respectively. Taxol content in cell suspension was high during exponential growth phase and decreased subsequently at the stationary phase. The maximum taxol production was observed in the stationary growth phase, reaching 0.53 mg L⁻¹ at day 25 of the culture. Our results can be provide an ample opportunity to take this protocol for extensive research for mass cultivation and enhanced anticancer compound production through different biotechnological strategies and large scale cultivation in bioreactor system.

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MYCELIUM GROWTH CHARACTERISTICS OF A VALUABLE
MEDICINAL MUSHROOM *GANODERMA* FROM GOLESTAN AND
MAZANDARAN PROVINCE

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Recent advances in biotechnology increased the role of different groups of organisms for obtaining biologically active compounds in the development of health-enhancing bio preparations and dietary supplements [1]. The objective of this research was *Ganoderma* a well known wood-inhabiting and medicinal mushroom. Species of *Ganoderma* possess various biological active compounds such as triterpens, polysaccharides and steroids [2]. Nevertheless, the screening and selection of fast growing strains producers of biologically active compounds is preliminary step in their biotechnological cultivation protocol. In order to achieve this goal, different sites of Golestan and Mazandaran Provinces were investigated for different species of this genus. Out of forty five isolates collected from different hosts and sites 26 mycelia were purified. Growth Rate ($GR=\Delta d/\Delta t$) and Growth Coefficient ($GC=dgh/t$) were measured for each isolate. Mycelial growth characteristic were analyzed by incubation of cultures on 2% malt-extract agar medium (MEA, pH = 5.5) at 25 °C. The results revealed that two isolates identified as *G. resinaceum* isolated from *Carpinus Betulus* L., Ghorooq Jungel and Noor Jungle had maximum GR= 1.1, 1.09 mm/day, respectively and *G. australe* isolated from *Pterocaria fraxinifolia* has set after the former species by Growth Rate of 1.06 mm/day.

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**INFLUENCE OF SALICYLIC ACID ON YIELD AND SOME
MORPHOLOGICAL PARAMETERS OF DRAGONHEAD UNDER
WATER STRESS**

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Dragonhead syn. Moldavian balm (*Dracocephalum Moldavica* L.) belongs to Lamiaceae family is widely used in folk medicine as painkiller and for the treatment of kidney problems. In order to investigate the effect of salicylic acid on yield and some morphological traits of Moldavian balm under water stress a field experiment was carried out at the Department of Natural Resources and Watershed of Piranshahr city during successive season 2012. The experimental design was spilt factorial in basis randomized complete block with three replications. The treatments were 3 levels of salicylic acid (0, 0.5 and 1 mM) as main plots and 3 levels of water stress (40, 80 and 120 mm evaporation from evaporation pan) as subplots. The results showed significant difference ($\alpha=1\%$) among water stress rates on plant height, flowering shoot length and shoot dry yield. The highest and lowest plant height, flowering shoots length and shoot dry yield were achieved in 40 mm and 120 mm evaporation from pan evaporation water stress treatments respectively. Also salicylic acid had significant effect ($\alpha=1\%$) on shoot dry yield. The highest shoot dry yield (29 g per plant) belonged to application of 1 Mm salicylic acid on plants. However flowering shoots number was not affected by salicylic acid and water stress. Moreover, there was no an interaction effect between salicylic acid and water stress on any of the parameters.

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**ANTIBACTERIAL EFFECTS OF FOUR MEDICINAL PLANTS
HYDROALCOHOLIC EXTRACTS AGAINST TWO ORAL BACTERIA:
AN IN VITRO STUDY**

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Oral infections are still considered as serious public health problems. One other hands the world attention to use of herbal medicine and traditional treatment are widely increasing, especially in developing countries. In the present study, we evaluated the antibacterial activity of five plant hydroalcoholic extracts that consists of leaves of *Juglans regia*, *Malva neglecta*, *Raphanus sativus* and fruit of *Capsicum annum* against two oral pathogens that are *Streptococcus mutans* & *Lactobacillus sp.* Plant materials were collected from original locations and their leaves and fruits were removed and dried in darkness and then finely pounded. The powdered samples were dissolved in distilled water and ethanol. The obtained suspension left for 4 day in refrigerator and then filtering through whatman paper. Filtrates dried in rotary evaporator and then freeze-drier. Antibacterial activity of extracts was evaluated by diffusion test. sterile blank paper disc containing concentration of 20 mg mL⁻¹ of extracts was applied onto the surface of Hinton Agar. For negative control, disks were impregnated with sterile water. For positive control different antibiotic disks were used. Plates were incubated at 37°C for 24h and diameters inhibition zones (mm) were determined. Among four tested samples, extracts of *M. Neglecta* and *R. Sativus* had weak antibacterial effects and produced the ZI ranging from 5 to 12 mm whereas *J. Regia* had the highest effect on inhibition of growth for *Streptococcus mutans*. The leaf extract of *Juglans regia* and fruit extract of *Capsicum annum* showed 3.5 and 2.5 cm zone of inhibition (ZI), respectively against *S. mutans* and *Lactobacillus sp.* While tested individually. Also in combination of extracts, not seen any significant synergistic activity. So that the combination of the both extracts (1:1) showed 2.6 and 2.1 cm ZI against *S. mutans* and *Lactobacillus*, respectively.

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**STUDY OF THE EFFECTS OF ESSENTIAL OILS OF CUMIN, SAVORY
AND CARDAMOM AS NATURAL ANTIOXIDANTS ON THE FLAVOR
AND OXIDATIVE STABILITY OF SOYBEAN OIL DURING THE
STORAGE**

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Oxidation reactions in edible oils and fats are regarded as a cause of spoilage [1]. Use of antioxidants can prevent oxidation [2, 3]. In this research, effects of adding three essential oils (*cumin*, *savory* and *cardamom*) at three different concentrations (0.2, 0.4 and 0.6 %, v/v) on acid value, peroxide value, induction period and flavor of soybean oil were evaluated at different storage times and temperatures according to Taguchi's experimental design. Based on the results of this study, type of essential oil, its concentration, storage temperature and storage time indicated significant effects ($P < 0.05$) on the peroxide value, acid value and the induction period. However, savory and cardamom showed the highest impact on the evaluated parameters (having the most effect on the induction period). Also, based on the results obtained for acid value, all the essential oils from this study indicated significant effects on the acid value. Cumin and savory showed significant effects on the peroxide value. Soybean oil containing the essential oils from this study had good flavor and high desirability with no clear preference among the three essential oils on the flavor and desirability by the sensory panel ($P > 0.05$). In addition, two concentrations of 0.4 and 0.6 (% v/v) can be regarded as suitable concentrations for reducing free fatty acids as well as peroxide value and enhancing the induction period of soybean oil. Concentration of essential oil within the studied range did not show a significant effect on the flavor. Two temperatures of 20 and 30 °C were found to be optimal temperatures for enhancing induction period and reducing the peroxide value of soybean oil. Effect of storage time and temperature on the acid value was also significant ($P < 0.05$). Two storage times of 2 and 4 months were found to be appropriate storage times for optimum induction periods of soybean oil, but storage times of 2 and 6 months were optimal times for minimum peroxide value. Increase in the storage time and temperature caused a decrease in the flavor and desirability of the oil. Considering the results of this study, essential oils can be suggested as natural antioxidants for use in oil industry under certain conditions.

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**DIAGNOSTIC VALUE OF LEAF ANATOMICAL FEATURES IN
SILENE COMMELINIFOLIA (CARYOPHYLLACEAE) COMPLEX**

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Silene with more than 700 species is the largest genus of the carnation family. The main center of its biodiversity is central Asia and south of Balkan [1]. Species delimitation is not resolved in this genus. In Iran 110 species of this genus are distributed from which 35 are endemic [2]. These species are of medicinal importance in Chinese traditional medicine. *Silene* root is used for worm removal and antimicrobial effect [3]. In present study 18 populations of *Silene commelinifolia* (section *Auriculatae*) has been studied to find leaf diagnostic anatomical features to clarify the subspecies limits in this taxon in Iran. Totally 14 qualitative and quantitative features were evaluated. Main differences were observed between subspecies based on collenchymas presence, hair frequency in adaxial and abaxial surface, mid rib shape, vascular bundle shape, cuticle thickness and cortex diameter. Different taxa are clearly separated based on observed leaf anatomical differences.

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**ANTIOXIDANT ACTIVITY, TOTAL PHENOLIC AND FLAVONOID
COMPOUNDS OF *MESPILUS GERMANICAL*. (ROSACEAE) LEAF
METHANOLIC EXTRACT IN DIFFERENT ALTITUDES**

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Many species of plants have been recognized to have pharmaceutical properties, e.g. antioxidant, anticancer, anti-inflammatory and antimicrobial effects. Recently, there has been an increased interest in identifying natural antioxidant compounds for use in pharmaceutical and food industries, mainly due to increased unintentional side-effects of synthetic antioxidants. Polyphenols are the major plant compounds with antioxidant activity. The aim of the present study is to determine the amount of total phenolic and flavonoid compounds and also the scavenging activity of DPPH properties of this plant in various altitudes (sea level, 1000, 2000 meter). *Mespilus germanica* L. leaf samples have been gathered randomly from Abbas Abad city and the surrounding altitudes (Mazandaran province). The amount of total phenolic, flavonoid compound and were performed based on DPPH method, [2, 1, 3] respectively. Results showed that the free radical scavenging were higher for the methanolic extract of collection samples of region with 2000 meter height in comparison with collection samples of region with 1000 meter height. The amount of phenolic compound in collected samples from region with 2000 meter height was more than other samples [187.76 ± 0.74 ($\mu\text{g GE/mg extract}$)^b]. The collected samples from 2000 meter height showed highest amount of flavonoid compound in compared with others [7.81 ± 3.32 ($\mu\text{gQE/mg extract}$)^c].

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CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *PISTACIA ATLANTICA* GALLS AND LEAVES BY COMBIPAL SYSTEM TECHNIQUE

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Pistacia atlantica, a multipurpose tree, is a drought-tolerant species, which is adapted to semi-arid and arid areas and also grows wild in Southern parts of Iran. *Pistacia* plants are traditionally known for their medicinal properties the gall of *P. atlantica* is used as an embalming gradient by rural habitants. The aim of this research was to determine the chemical compositions of the galls and leaves of *P. atlantica* trees grown in Fars province of Iran. The volatile components from fresh sample were identified and analyzed by HS (headspace)-GC-MS on the Combi PAL System technique. The numbers of volatile compound identified in the galls and leaves were 23 and 20, respectively. The main compounds of the galls and leaves were α -Pinene (68.2%, 57.9%), Myrcene (15.3%, 14.3%), β -Pinene (6.0%, 7.0%) and Camphene (5.0%, 8.7%), respectively.

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**INTRASPECIFIC VARIABILITY OF THE ESSENTIAL OIL OF
OCIMUM BASILICUM L. VAR. *PURPURASCENS* AND VAR.
DIANATNEJADII FROM IRAN**

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Twenty-one accessions of *Ocimum basilicum* belonging to two different varieties in Iran (var. *purpurascens* and var. *dianatnejadii*) were subjected to a chemical characterization of essential oil components by gas chromatography/mass spectrometry (GC/MS) and identify the different possible chemotypes of studied accessions. Altogether, 49 compounds were identified in the oils that accounting for 96.6-99.7% of the total oils. The main constituents of the essential oils were methyl chavicol (33.6-49.1%) and linalool (14.4-39.3%) that indicating they were the common compounds in the varieties of *O. basilicum* and the essential oils of the 21 accessions chiefly consisted of aromatic and oxygenated monoterpene compounds. The essential oil components except two main constituent those which comprised 20% or more of the total, were especially variable in occurrence and concentration among the different accessions, ranging from absent in some varieties to more than 4% of the total essential oil composition in others. Monoterpene hydrocarbon compounds were presented in the essential oil of all accession of *purpurascens* variety and didn't identify in those of related to var. *dianatnejadii*, indicating that monoterpene hydrocarbons could be considered as the marker constituents of *purpurascens* variety. To investigate the chemical variations of essential oils in different accessions of *O. basilicum* L., the composition data were analyzed by cluster analysis. The cluster analysis showed a clear separation of *O. basilicum* var. *purpurascens* and *O. basilicum* var. *dianatnejadii*, but these dates did not show chemotype variation in studied accessions. In conclusion, GC/MS in combination with chemometric techniques could provide a flexible and reliable method for characterizing the chemical profiles of different varieties of *Ocimum basilicum* L.

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**STUDY OF INSECTICIDAL ACTIVITY OF PLANT EXTRACTS FROM
ACACIA SALICINA LINDL, DODONAEA VISCOSA L., AND
ACHILLEA MILLEFOLIUM L. AGAINST APHIS FABAE SCOPE.
(HEMI.: APHIDIDAE)**

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Fatality of plants extract's *Achillea millefolium* L. *Acacia salicina* Lindl. And *Dodonaea viscosa* L. on the mature wingless species aphids of *Aphis fabae* Scop (Hemi.: Aphididae) were investigated in temperature conditions of 27 ± 3 °C and relative humidity of 60 ± 5 . Afterwards, LC_{50} was determined after the calculation of losses. In the next stage, aphids were exposed to different concentrations of extract for a minimum time of 24 hours and a maximum time of 72 hours. Leaf dipping method was used to perform biometrics of extract. An increase in concentration and time led to an increase in mortality rate. In *Achillea millefolium* and *Acacia salicina* There was no significant difference between the two extract samples with a concentration of 6200 and 9000 parts per million (ppm) with regard to insecticidity, It was observed that almost all the insects were killed in the mentioned concentrations after 72 hour. The highest mortality rate was related to the treatment process of *Achillea millefolium* extract. *Aphis fabae* LC_{50} determined values for *Achillea millefolium*, *Acacia salicina* And *Dodonaea viscosa* extract were respectively equal to concentration of 2147.83, 2636.33 and 6067.36 ppm. The obtained results demonstrated the efficiency of practical usage of mentioned plants against aphids, especially *Achillea millefolium*.

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**EFFECT OF GAMMA IRRADIATION ON THE TANNINS AND
PHENOLICS OF ARTEMISIA AUCHERI BOISS**

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Artemisia is a medicinal plant belongs to Asteracea family. It covers about 3/4 of Iran plateau vegetation area [1]. Due to richness of important components of medicinal materials for therapeutic Effects of this plant has come to consideration significantly [2]. In this study *in vitro* cultured with at least, three replications were used. *Artemisia* plant was cultured on MS medium and after one week plants were exposed to gamma radiation at 50-100-200 (Gr) and the content of tannins and phenolics were determined. Results showed that gamma irradiation increased total phenolics components of the plant. It seems that increasing the content of total phenolics and tannins might be due to genetic or epigenetic changes of the plant cells after gamma radiation.

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**MORPHOLOGICAL CHARACTERIZATION OF SOME CANNABIS
ACCESSIONS FROM DIFFERENT REGIONS OF IRAN IN RELATION
TO THEIR MEDICINAL OR FIBER PRODUCTION EFFICIENCY**

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Cannabis sativa is one of the most important cultivated medicinal plants, that has been used for its fiber, medicinal and nutritional properties for thousands of years. Recently its pain relieving, anti-spasm and anti-cancer properties have recently attracted new interest and opportunities on cannabis researches [1-4]. Though Iran is one of origins of cannabis, unfortunately there has not been an official scientific study on Iranian cannabis germplasm yet [5]. Therefore, this study was conducted to analyze the morphological traits of some accessions of Iranian cannabis were collected from Isfahan, Ardabil, Qom, Urmia, Khoy, Kashan, Kerman, Nishapur, Mahabad, Mashhad and to evaluate their morphological properties in relation to their medicinal or fiber production efficiency. Twenty-three morphological traits related to important vegetative, flowering and seed-maturing phases were measured separately for female and male plants. Phenological observations and morphological data analysis showed a wide diversity among accessions as expected. Analysis of variance was performed among populations and male and female plants within the populations. The results showed significant differences among genotypes for 19 traits out of 23 among populations and 13 other traits between male and female plants within the populations and some traits like height, number of nodes in flowering part of stem, the length of flowering part of the stem had significant differences in both groups of analysis. Cluster analysis divided the genotypes into six clusters. The clustering pattern of the accessions revealed that geographic diversity was not related to agronomic diversity.

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**EFFECTS OF NANO FERTILIZERS AND HEAVY METALS ON SOME
PHYSIO-MORPHOLOGICAL TRAITS OF THREE MEDICINAL
SPECIES AT SEEDLING STAGE**

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In order to effects of nano fertilizers and heavy metals on some physio-morphological traits of three medicinal species at seedling stage, an experiment was conducted under greenhouse condition in Ferdowsi University of Mashhad, Iran during 2012. Treatments were combination of 3 medicinal species (*Ocimum bacilicum* L., *Calendula officinalis* L. and *Cucurbita pepo* L.), 2 nano fertilizers (iron and titanium) in 0, 2 and 4 ppm and 2 heavy metals (lead and cadmium) in 0 and 50 ppm arranged in a completely randomized design with 3 replications. The results indicated that nano fertilizers affected root and shoot length significantly. With increasing iron fertilizer, shoot length increased, but root, length did not follow this trend. The highest shoot and root length were observed in 4 and 0 ppm, respectively. With increasing titanium level, root and shoot length and weight increased. The interaction of species and iron and titanium fertilizers was significant on studied traits, statistically. The highest and lowest shoot and root length were observed in *Cucurbita pepo* L., 4 ppm titanium and 0 ppm iron treatment. The interaction of heavy metals was significant on studied parameters. The highest root and shoot length was observed in 50 ppm cadmium and 0 ppm lead treatment. In general, the results indicated that the highest shoot length was obtained in 0 ppm iron, 4 ppm titanium, 0 ppm lead and 0 ppm cadmium treatment in *Cucurbita pepo* L. the highest root length was observed in 0 ppm iron, 4 ppm titanium, 50 ppm lead and 0 ppm cadmium treatment in *Cucurbita pepo* L.

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**PATH ANALYSIS OF THE RELATIONSHIPS BETWEEN SEED YIELD
AND SOME MORPHOLOGICAL TRAITS IN CUMIN
(*CUMINUM CYMINUM* L.) TO DROUGHT STRESS**

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Cumin is an important medicinal plant and it is essential to know the relationships between yield and its components in cumin breeding programs. A field experiment was conducted in a randomized complete block design with two replications to determine the effects of drought on cumin yield components. Some traits such as number of branch, height, number of umbel per plant, number of seed per umbel, biological and seed yield were assessed. Correlations and path coefficient analyses were carried out to determine the role of individual factors influencing the drought stress. In normal conditions number of branches ($r= 0.75^{**}$), biological yield ($r= 0.73^{**}$) and in stress conditions plant height ($r= 0.70^{**}$), number of umbels per plant ($r= 0.63^{**}$) showed the most correlated with seed. Traits were entered into the stepwise regression model using path analysis. Path coefficients indicated that number of branches and height had the highest positive direct effect on grain yield in normal and stress conditions, respectively.

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**BIODIVERSITY OF MEDICINAL SHRUBS IN THE BEECH
COMMUNITIES (CASE STUDY: MASAL, GUILAN)**

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The use of medicinal herbs is as old as the history of human life. The flora of Iran has 8000 species that many of them are medicinal use. In the forests of north Iran, there is many plants species with medicinal use. The most important of them are the *Mespilus germanica* and *Prunus spinosa* species. This research studied the diversity of medicinal shrubs in protected and non-protected forest stands. For this purpose, 100 ha of this forest (50 ha of protected area and 50 ha of non-protected area) were surveyed. In total, 50 sampling plots were taken using random-systematic with 100 × 200 m network. The number and type of shrubs were record. The result indicated that the density of shrubs and mean diversity and its components i.e. richness and evenness had higher value in non- protected than protected area. Therefore, management strategies must be taken for utilization of forest products with minimum degradation.

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**EFFECT OF SOWING DATES AND DEPTHS ON EMERGENCE
CHARACTERISTICS AND TUBER PRODUCTION OF MEDICO-
INDUSTRIAL *FERULA ASSA-FOETIDA***

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To assessing the effects of sowing dates and depths on emergence and tuber production of endangered medico- industrial *Ferula assa-foetida*, an outdoor pot experiment conducted in Natural Resources and Environment Faculty of Ferdowsi University of Mashhad at 2011. The experiment had done as Factorial in completely randomized design with 10 replications. Treatments contained 5 levels of sowing dates (26 January, 10 March, 25 March, 15 April, 25 April) and 2 levels of sowing depth (2 and 4 cm). Results showed that sowing dates, depths, and their interactions have significant effect on the percentage of seed emergence of *Ferula assa-foetida*. However, emergence rate and tuber production of the plant was affected only by sowing date. So, the highest emergence percentage (68%) and emergence rate achieved at the first sowing date (26 January) and the lowest (less than 2%) observed at two last sowing dates (15 and 25 April). The first sowing date, also, had the highest tuber production of 1.3 tubers in average per pot, while no tubers were produced at the last two sowing dates. In comparison between two depths, higher emergence rate was observed at the 4 cm depth vs. 2 cm. In general, it seems that deep sowing of this plant in mid-winter versus spring sowing is more successful due to the higher emergence and emergence rate and also tuber production.

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SEPARATION OF DNA FOR MOLECULAR MARKERS ANALYSIS
FROM LEAVES OF THE *MATRICARIA CHAMOMILLA*

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In the present study, three DNA extraction procedures were examined to determine which might yield DNA from *Matricaria chamomilla* leaves suitable for molecular analysis for RAPD [1], SSR and etc analysis. The DNA Extraction from of the plant tissue is difficult because of their difference of amounts Anthemine and Anthemine Acid that interfere with DNA extractions. The three methods examined were: the CTAB procedure and the modified CTAB and protocol modification of Dellaporta *et al.* Only the CTAB method consistently yielded DNA suitable for Polymerase Chain Reaction (PCR) amplification. The quality and quantity of extracted genomic DNA gained from these methods are deliberated by means UV biophotometer, electrophoresis in 1.2% agarose gel and PCR. The current protocol is simple, and The procedure can be completed in 2 h and many samples be processed can at the same time.

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**INVESTIGATION OF THE EFFECT OF NUTRIENT RESOURCES ON
WEED DIVERSITY AND QUANTITATIVE AND QUALITATIVE
TRAITS OF CAT TYME (*TEUCRIUM POLIUM*)**

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In order to investigate the effects of nutrient resources and weed management on qualitative and quantitative criteria of cat thyme (*Teucrium polium*), an experiment was conducted as split plot based on a complete randomized block design with 3 replications at the agricultural research station, Ferdowsi University of Mashhad, Iran, during the years 2008 and 2009. Treatments included different nutrient resources: manure fertilizer (10 ton/ha), chemical fertilizer (based on the amount of macro elements existing in manure fertilizer), Nitroxin biological fertilizer (4 l/ha), Manure fertilizer (10 ton/ha) plus chemical fertilizer (based on the amount of macro elements existing in manure fertilizer), Nitroxin biological fertilizer (4 l/ha) plus manure fertilizer (10 ton/ha) and control (not fertilizer) under weed infested and weed free conditions. Weed management was located in main plots and nutrient resource in sub plots. The results indicated that the effects of nutrient resource and weed management on weed density were significant, only in the second sampling in second year. So that, the highest weed density was observed in Nitroxin fertilizer plus manure under weed infested condition (288 plants per m²). In first year, the highest weed Shannon index was obtained in manure treatment under weed infested condition (0.76). Also, the lowest weed Shannon index was observed in Nitroxin treatment under weed free condition (0.40). In the second year, the highest and lowest Shannon index was obtained in Nitroxin plus manure treatment in weed infested condition (0.80) and Nitroxin treatment in weed free condition (0.45) respectively. The negative significant correlation was observed between weed weight and density with essential oil yield and percent.

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**ANTIHYPERGLYCEMIC ACTIVITY OF HYDRO-ALCOHOLIC
EXTRACT OF *URTICA DIOICA* ON TYPE 1 DIABETIC MALE MICE**

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Diabetes mellitus is the most common metabolic disorder in the world. In traditional medicine some plants have been used to treat diabetes. One of these herbs is *Urtica Dioica* (UD) which traditionally used in Turkey, Brasil, Jordan and with much frequency in Iran. The goal of this study was to investigate the effect of the hydro-alcoholic extract of UD on glycemic level and body weight in the type 1 diabetic mice. To perform the study the mature and fresh leaves of UD were collected from Sowmeh Sara, in Guilan province. The preparation of extraction was done in medical university lab. This study was carried out on 40 Swiss Albino male mice, randomly distributed in 4 groups. All the animals were weighed prior to administration of streptozotocin (STZ) and after treatment, and the range of weight was between 30-40gr. Diabetes was induced by multiple intraperitoneal (IP) injection (50 mg/kg) of STZ in 20 mice (Diabetic groups). Hydro-alcoholic extract of UD was injected (IP) to one of the diabetic groups and one of our control groups with the dosage of 100 mg/kg for 28 days. Two other groups received water (IP) injection. Blood glucose levels were estimated by glucometer before and after treatment. Data analysis showed significantly lower levels of blood glucose after the treatment with UD extract as compared with the control groups ($p < 0.05$) and the change in weight from baseline differ significantly among groups ($p < 0.05$). The results obtained in this study suggest that UD has anti-hyperglycemic activity on STZ-induced diabetic model mice [1, 2].

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**IDENTIFICATION AND QUANTIFICATION OF ANTIOXIDANTS
FOUND IN LEMON JUICE**

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Currently some parameters such as formalin index, acidity, brix, pH and dry content are used for safety assessment of branded lemon juice. In this paper vitamin C, antioxidant and phenolic compounds of lemon juice were studied to introduce some new and reliable index for safety assessment. Lemon Juices consist of branded and natural group were investigated mainly on total phenolic compounds (Folin-Ciocalteu), and ascorbic acid content (2-4 dinitrophenyl hydrazine) by spectrophotometer and antioxidant capacity (2, 2-diphenyl-1-picrylhydrazyl) by HPLC methods.

Total phenolic content of both groups didn't show any significant differences but natural group had the greater amount of antioxidant capacity (795.61 mg VEE.L⁻¹) and also higher ascorbic acid content (187.52 mg.L⁻¹). Antioxidant capacity ranged from 476.60 to 1378.12 and 235.47 to 888.59 (mg VEE.L⁻¹) in the branded and natural samples group respectively. The amount of ascorbic acid in branded lemon juices ranged from 23.53 to 492.91 and 99.32 to 196.49 mgL⁻¹ in natural group. Analysis between three measured parameters indicated that phenolic compound and ascorbic acid content had significant correlation with antioxidant capacity. Ascorbic acid content and antioxidant capacity can be used for safety assessment of lemon juice, but further investigation such as flavonoid profile may be more helpful.



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**ANTI-ULCEROGENIC ACTIVITY OF THE POMEGRANATE PEEL
(*PUNICA GRANATUM L.*) METHANOL EXTRACT**

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Pomegranate (*Punica granatum L.*) is an herbal preparation that has been suggested as useful in the treatment of gastrointestinal disorders. In the present study pomegranate peel methanol extract was tested for its antiulcerogenic effect. Oral pretreatment with peel extracts (25, 50 and 100 mg/kg) for 15 days protected the gastric mucosa against the damage induced by indomethacin (50 mg/kg). The incidence of ulceration in the control group was 100%. The best results were found in a dosage of 50 mg/kg in sour summer cultivar which inhibited the peptic ulcer as compared with indomethacin induced gastric ulcer. Lowest ulcer index (5.4 ± 0.55), an apparent decrease in the infiltration of polymorphonuclear leukocytes and hemorrhage were observed after administration of sour summer extracts (50 mg/kg). The results concluded that pomegranate peel extract especially sour summer possess high anti-ulcer potential which is due to high antioxidant activity which can provide an extra income and may contribute to have good nutritional values of this product.



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**SURVEY OF PHYTOCHEMICAL CONSTITUENTS AND
ANTIMICROBIAL ACTIVITIES OF *ALOE VERA***

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The aim of the study was to investigate the *Aloe vera* phytochemical compounds and antimicrobial activity of different extracts. The phytochemical compound screened by qualitative and GC-MS method. Qualitatively analyzed Tannin, Saponin, Flavonoids and Terpenoids gave positive results and phlobactanins and Steroids and Steroids gave negative results. In the GC-MS analysis, 26 bioactive phytochemical compounds were identified in the ethanolic extract of *Aloe vera*. Three different solvents such as aqueous, ethanol and acetone were used to extract the bioactive compounds from the leaves of *Aloe vera* to screen the antimicrobial activity selected human clinical pathogens by agar diffusion method. The maximum antibacterial activities were observed in acetone extracts (12±0.45nm, 20±0.35nm, 20±0.57nm and 15±0.38nm) other than aqueous extracts and ethanol extract. Antifungal activity of *Aloe vera* was analyzed against *Aspergillus flavus* and *Aspergillus niger*. The maximum antifungal activity was observed in acetone extracts (15±0.73nm and 8±0.37nm) when compared other extracts. *Aloe vera* plant extract with acetone can be used as antimicrobial agents.

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**THE EFFECTS OF SOME HEAVY METALS ON PSORALEN ANTI
CANCEROUS COMPOUND IN VITRO CULTURE CONDITIONS**

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Psoralea corylifolia belonging to the family of Fabaceae that is member of endangered plants. The medicinal value of this plant is due to valuable secondary metabolites such as isoflavonoids and furanocoumarins. Psoralen is one of the important components between all of valuable medicinal components in this plant. It is also used externally to treat various skin ailments, breast, lung and blood cancers. Tissue culture is one of the biotechnological techniques, that is important strategy for enhancement of secondary metabolites. The expression of secondary metabolites pathway is variable by externals factors such as different level of nutrition materials, environmental stress, inducers and regulators growth. The inducers are biotic (plant cell and microbes) and abiotic (heavy and rare metals, organic and precursors elicitors) that are improved the secondary metabolites. This strategy is based on the accumulation secondary metabolites in response against to biotic and abiotic stress. In present research heavy metals such as $Pb(NO_3)_2$, $CdCl_2$, As_2O_3 , $CoCl_2$, $FeSO_4$, $ZnSO_4$, $CuSO_4$ and $AgNO_3$ in different concentrations (0, 1, 5, 25, 50, 100 and 150 mg/l) are added to the culture medium ($B_5+5 \mu M BA$). So the explants of the *Psoralea corylifolia* node were cultured *in vitro* condition. The results of HPLC analysis showed that there were significant differences in psorolen content between different parts of plant, so that the highest amount of psorolen (3058 $\mu g/g$ fresh wt.) obtained in brown seeds. Also results revealed that heavy metals increased the psorolen content significantly. Finally, $Pb(NO_3)_2$ in 150 mg/l concentration produced the highest amount of the psorolen (2434/5 $\mu g/g$ fresh wt.) in compare to all of the treatments.



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**CHEMICAL-GENETIC PROFILE ANALYSIS OF EUGENOL IN
*SACCHAROMYCES CEREVISIAE***

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The antifungal activity of eugenol was evaluated using the broth microdilution assay with *Saccharomyces cerevisiae*. The results indicate that minimum inhibitory concentration (MIC₁₀₀) for eugenol is in the range of 0.025-0.03% (v/v). Chemical-genetic profile analysis was completed with eugenol using ~4700 haploid *S. cerevisiae* gene deletion mutants to find out the mode of action of eugenol in the yeast cell. 22 *S. cerevisiae* deletion mutants with the greatest degree of susceptibility to subinhibitory concentration of eugenol (0.017%) were selected by digital analysis. Cellular roles of deleted genes in the most susceptible mutants and gene ontology annotation analysis using online gene profiling software (Profcom, gprofiler and GeneMANIA) indicate that the targets for eugenol include pathways involved in aromatic and branch-chain amino acids biosynthesis and transport pathways. Finally, Spot test analysis of targeted mutants confirmed the accuracy of our large-scale approach to detect drug sensitive mutants.

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**EFFECT OF SEED COAT COLOUR ON SALINITY TOLERANCE IN
MUSTARD (*BRASSICA COMPESTRIS* VAR. *PARKLAND*) AS A
MEDICINAL PLANT**

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This study investigated the effects of seed coat colour on Germination percentage, rate of germination, shoot length and radicle length under salt stress. For this purpose, seed lots of mustard visually inspected in terms of seed color and then the seeds were divided to coat color yellow and black. An experimental was carry out in randomized complete design with four replications in factorial arrangement in 2012 year. Treatments included: two types seed coat color (black and yellow) and second factor were six NaCl concentrations were used including distilled water as control (0), -2, -4, -6, -8 and -10 bars. Results showed significant differences in salinity tolerance between yellow and black seed coat color. Maximum germination occurred in distilled water, and increase in NaCl concentration progressively decrease Germination percentage, rate of germination, shoot length and radicle length in both morph of seeds. The yellow seeds were more resistance to salinity stress than black ones. In general they are suitable to be used as genetic resources for improvement of salinity tolerance in mustard.



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ISOLATION, PURIFICATION AND STRUCTURE ELUCIDATION OF
FLAVONOIDS FROM *LAGOCHILUS CABULICUS BENTH.*

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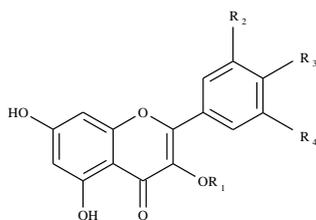
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The genus, *Lagochilus*, belongs to lamiaceae family and consists of 44 species all over the world, 33 of which grow in central Asia. Five species of this genus have been found in flora Iranica and 4 species are exclusively growing in Iran [1, 2]. Chemical studies on some *Lagochilus* species have studied [3-7]. One of these species, *Lagochilus Cabulicus* Benth., was collected during flowering stage, dried at ambient temperature and shade condition and cut into small pieces. Plant material was successively extracted with methanol solvent using percolation method. Main flavonoids compounds were separated and isolated by column and thin layer chromatography. The isolated compounds were identified by spectroscopic methods, including ¹H-NMR and ¹³C-NMR.

In conclusion, seven flavonoids, Selagin (1), Quercetin (2), Quercetin 3-O-β-D-glucopyranoside (3), Quercetin 3-O-α-L-rhamnopyranosyl (1→6) β-D-glucopyranoside (4), Myricetin (5), Kaempferol (6), Kaempferol-3-O-β-D-glucopyranoside (7), have been identified, which not previously reported from this plant species [8-18].



- R₁=H, R₂=OMe, R₃=OH, R₄=OH (1)
R₁=H, R₂=OH, R₃=OH, R₄=H (2)
R₁=Glu, R₂=OH, R₃=OH, R₄=H (3)
R₁=Rh-Glu, R₂=OH, R₃=OH, R₄=H (4)
R₁=H, R₂=OH, R₃=OH, R₄=OH (5)
R₁=H, R₂=H, R₃=OH, R₄=H (6)
R₁=Glu, R₂=H, R₃=OH, R₄=H (7)



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**THE EFFECT OF DROUGHT STRESS ON SOME FACTORS OF
QUANTITY AND QUALITY OF *ARTEMISIA DRACUNCULUS* L.**

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Drought stress is one of main factor on produce of natural production in bad environmental conditions medicinal plant product secondary metabolism to care of plant apposite of stresses. In order to study drought stress effect on quantitative and qualitative features of *Artemisia dracunculus* L. A research was conducted under field condition in Alborz station, Iran 2009. Experiment was conducted using randomized complete block design with 3 replications. Treatment included 100% of field capacity (non stress), 80% of field capacity (mild drought stress), 60% of field capacity (moderate drought stress), 40% of field capacity (severe drought stress). According to the results of statistical analysis; drought stress had significant effect on floral dry shoot yield ($p \leq 0.01$). With increase of drought stress, exchange floral dry shoot yield from 9338.2 kg/ha in control to 4826.5 kg/ha in 40%FC. Drought stress had significant effect on percentage of essential oil ($\alpha \leq 0.05$). The most percentage of essential oil (1.33%) was related to 40% FC (severe stress). Drought stress had significant effect on yield of essential oil ($\alpha \leq 0.01$). The greatest of essential oil yield compound was related to 60%FC (moderate drought stress). The most percentage of E- β -ocimene and Z- β -ocimene was related to 40%. The greatest of Spathulenol% and Estragol (85.03%) was related to 100%FC. The most percentage of E- β -ocimene and Z- β -ocimene was related to 40%. The greatest of Spathulenol% and Estragol was related to 100%FC. The greatest of essential oil yield compounds was related to 60%FC (moderate drought stress).

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**CHEMICAL CONSTITUTES OF THE ESSENTIAL OIL OF
ARTEMISIA AUCHERI BOISS FROM ALPINE IN KERMAN**

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The genus *Artemisia*, with the common Persian name of ‘dermane’, includes 34 species that are found wild all over Iran. The main constituents of *Artemisia aucheri* Boiss oil from north of Iran (Semnan) were reported to be verbenone (21.5%), camphor (21.0%) 1,8-cineole (8.3%) and *trans*-verbenol (8.1%) [2]. Result of other study showed that the main constituents of *A. aucheri* Boiss oil were camphor (45.5%) and 1,8-cineole (14.3%) [3]. Hydro-distillated essential oil of *A. aucheri* Boiss inflorescences collected from alpine area of Zagros Mountains, Dehbakri (latitude: 29° 02′ N; longitude: 58° 56′ E; altitude: 2600 meters above sea level) in Kerman province, South Iran, were analyzed by gas chromatography–mass spectrometry (GC–MS). The major constituents of essential oil of *A. aucheri* Boiss inflorescences were santolina triene (12.7%), borneol (8.3%), *E*-caryophyllene (6.6%) and linalool (5.1%).

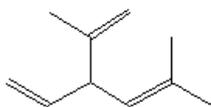


Figure 1 Structure of santolina triene (C₁₀H₁₆)

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**DETERMINATION OF CARBOHYDRATE AND NUTRIENT CONTENT
IN *LYCIUM RUTHENICUM* MURRY PLANT**

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Carbohydrates are a group of polyhydroxy aldehydes, ketones, acids or their derivatives, together with linear and cyclic polyols. Sometimes, carbohydrates are referred to simply as sugars and their derivatives. Carbohydrates are found abundantly in nature, both in plants and animals, and are essential constituents of all living matter [1]. On the other hand understanding the nutrient content of a plant body will be a useful way for determining rangeland capacity, the most proper time of utilization of range plants, prediction of malnutrition and evaluation of nutrition requirements of plants [2].

Lycium ruthenicum Murry a member of Solanaceae family is a unique nutritional food, which widely distributes in desert of Birjand, Iran. In this study, we evaluate Lycium properties including carbohydrates, crude protein (c.p) and fat content using Deriaz (1961), Kjeldahl (1965) and Soxhlet extraction methods, respectively. Crude fiber, neutral detergent fiber (NDF) and acid detergent fiber (ADF) were determined according to the method of Goering and Van Soest (1970). The results showed the quantity of crude protein (c.p) and fat content in seed were higher than root and leaf. Also the amounts of crude fiber, ADF and NDF have a higher quantity in the root compared to the leaf and seed.

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COMPARISON OF TOTAL PHENOLIC CONTENT (TPC) AND
FLAVONOIDS IN LAMIACEAE AND PLUMBAGINACEAE FAMILY

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Plants are known for their health protective effect mostly attributed to their polyphenolic components. Mainly flavonoids and total phenolic compounds which possess antioxidant activity against the Reactive Oxygen Species (ROS) [1]. *Otostegia persica* belongs to the family Lamiaceae, and is a fragrant shrub that grows widely in southern Fars province area and *Acantholimon collare* of the Plumbaginaceae family is a fragrant shrub that grows in southern khorasan area [2]. In this research work Total phenolic content (TPC) and flavonoids of aqueous and ethanol extracts of *O. persica* and *A. collare* and especially comparison were studied. TPC was measured using Folin–Ciocalteu method [3] and the total flavonoid content was determined using a spectrometric method [4] that the result is shown in table 1.

The results showed that the highest amount of TPC was 2.29 mg gallic acid g⁻¹ and the highest amount of flavonoids was 0.09 mg rutin g⁻¹ followed by aqueous extract of *O. persica* plant. Generally results of the present study demonstrated that the aqueous extract is more effective extraction of polyphenolic compounds from herbs and also *O. persica* plant root is more content polyphenolic compounds than *A. collare* plant root.

Table1: The value of polyphenolic compounds of *O.persica* & *A.collare* (mg /g dry plant)

Organ	Compounds	Extracts (mg/g)	
		Ethanol	Aqueous
Root of <i>O. persica</i>	TPC	1.03±0.05	2.29±0.1
	Flavonoids	0.08±0.02	0.09±0.03
Root of <i>A. collare</i>	TPC	0.04±0.01	1.13±0.07
	Flavonoids	0.08±0.04	0.01±0.008

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**CHEMICAL COMPOSITION OF THE ESSENTIAL OILS OF
TWO AROMATIC PLANTS SPECIES (ASTERACEAE)**

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Achillea (Yarrow) is one of the most important genera of the Asteraceae family. Nineteen species of this genus are found in Iran, among which seven are endemic [1]. The genus *Artemisia*, with the common Persian name of 'dermane', includes 34 species that are found wild all over Iran [1]. Hydro-distilled essential oils of *Artemisia chamaemelifolia* Vill and *Achillea wilhelmsii* c. Koch. collected from Pelor region in Mazandaran province, North Iran, and the Karkas mountains in Kashan, Central Iran were analyzed by gas chromatography (GC) and gas chromatography–mass spectrometry (GC–MS). The main compositions of essential oil of *Artemisia chamaemelifolia* Vill aerial parts at 50% flowering were 1,8-cineole (31.4%), camphor (7.6%), borneol (7.0%) and terpene-4-ol (4.1%). Results a previous study showed that the major constituents of the essential oil obtained from the dried flowering aerial parts of *Artemisia chamaemelifolia* Vill were vulgarone B (38.8%), santoliny acetate (10.5%) and 14-hydroxy-9-epi- β -caryophyllene (8.4%) [2]. The major constituents of essential oils were lavandulyl acetate (27.91%), linalool (19%) 1, 8-cineole (10%), lavandulol (7%) and α -pinene (6%). The essential oil of *A. wilhelmsii* C. Koch were characterized by high levels of oxygenated monoterpenes including 1, 8-cineole, lavandulol and linalool, followed by monoterpene hydrocarbon including α -pinene. Results of a previous study showed that carvacrol (25.1%), linalool (11.0%), 1, 8-cineole (10.3%), E-nerolidol (9.0%) and borneol (6.4%) were main constituents in essential oil of *A. wilhelmsii* C. Koch. [3].

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IMPROVE IN VITRO CULTURE OF *LIPPIA CITRIODORA* BY USING
GARLIC EXTRACT

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Lippia citriodora (Verbenaceae) is an important, perennial and deciduous shrub medicinal plant[1], distributed in tropical and subtropical area of the world[2]. Auxillary buds of *lippia citriodora* were cultured on MS medium supplemented with different concentration of garlic extract (GE) (0, 100, 200, 300, 400 mg /L) to *in vitro* shoot and root induction. The result indicated that shoot formation evaluated of efficiency increased with increasing concentration of GE. Also, Maximum numbers and length of shoots (2 and 43.5 cm) were achieved on MS medium containing with 400 mg /L of GE. The Highest concentrations of GE (400 mg /L) increased the number of induced roots, while the length of roots reduced with increasing concentration of GE in the media. Therefore it seems GE can be substitute with BA micro propagation *L. citriodora* .however, the further study is necessary for determining of exact effect of garlic extract on in vitro culture of *L. citriodora*.

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THE EFFECT OF VARIOUS HORMONES ON IN VITRO EMBRYO GERMINATION AND CALLUS INDUCTION IN *FERULAGO ANGULATA* SUBSP *CARDUCHORUM*, AN ENDANGERED MEDICINAL PLANT

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Ferulago (Known in Iran as Chavir) belonging to the Apiaceae family is an endangered medicinally important shrub with 60-150 cm tall, grows at altitudes of 1900- 3200 m (above sea level) [3, 5]. Also, *Ferulago angulata* is recorded as a vulnerable species in the Red Data Book of Iran[1].The essential oil of seeds and aerial parts of this plant contains variety of components with different therapeutically effects. *Ferulago* species are used in folk medicine for their sedative, tonic, digestive, anti-parasitic antibacterial and antifungal effects [2-5]. The mature seeds of this plant were received from research station of Kermanshah in September. Various explants including seeds, embryo and segmented seeds were cultured on MS medium supplemented with various concentration of BAP and 2, 4-D for seed germination and callus induction. Our results indicated that none of the seeds and segmented seeds germinated on any of treatments. In contrast, embryos were germinated on 1/2 MS without any growth regulators. Maximum callus induction was obtained on Ms Medium achieved with 0.5 mg l⁻¹ 2,4-D in combination with 2 mg l⁻¹ of BAP. The present work has established an effective strategy for breaking seed dormancy and callus induction of *Ferulago angulata* through embryo culture.

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DESIGN AND DEVELOPMENT OF SELF-NANOEMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS) OF *BOSWELLIA SERRATA* EXTRACT FOR ORAL DRUG DELIVERY

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In the present study self-nanoemulsifying drug delivery system (SNEDDS) of *Boswellia serrata* extract was developed and optimized on the basis of nanoemulsion region determined through construction of pseudo-ternary phase diagram. The optimized SNEDDS formulation were characterized for droplet size, viscosity, zeta potential, transmission electron microscopy, refractive index, optical microscopy, percentage transmittance, self emulsification time, in-vitro dissolution study, ex-vivo rat gut studies and in-vivo studies. The optimized SNEDDS formulation composed of Cremophor EL, capryol 90 with Tarancutol® HP and Labrafil M2125 CS as per the limit of inactive ingredients guidelines of FDA and it remained stable after storage at 3 months duration. The C_{max} of SNEDDS was found to be 287.14 ng/mL whereas its value for the marketed formulation and suspension was found to be 121.48 ng/mL and 37.24 ng/mL respectively. Statistically, the C_{max} of *Boswellia* SNEDDS was found to be extremely significant ($p < 0.001$) in comparison to the drug suspension and marketed formulation. Percentage relative bioavailability of SNEDDS was found to be 9 fold as compared to plain formulation. Based on the pharmacokinetic results, the *Boswellia serrata* SNEDDS product was found to be supra bioavailable as compared to the reference product, Shallaki capsules and *Boswellia serrata* plain suspension. The present study confirmed that the developed SNEDDS formulations was superior to commercial formulation with respect to in vitro dissolution profile, pharmacokinetic and pharmacodynamic studies and could be used as possible nanocarrier system to deal with poorly soluble *Boswellia serrata* extract (AKBA) and later on increase in bioavailability because of droplet size in nanometers The usefulness of SNEDDS of *Boswellia serrata* in the treatment of inflammatory diseases like arthritis was also assessed pharmacodynamically by carrageenan induced rat paw edema.

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**CHEMICAL COMPOSITION AND ANTIMICROBIAL ACTIVITY OF
FERULA BEHBODIANA ESSENTIAL OIL FROM IRAN**

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For the first time, the hydro-distilled oil from the aerial parts of *Ferula behboudiana*, which is endemic to Iran, were analyzed by GC and GC-MS. Thirteen compounds, accounting for 98.5% of the total oil, were identified. The main constituents were sabinene (75.2%), (*E*)-caryophyllene (16.1%), β -myrcene (2.3%) and α -pinene (2.0%). Mono- and sesquiterpene hydrocarbons and oxygenated monoterpenes comprised 82.1%, 16.1% and 0.3% of the oil, respectively. The essential oil exhibited moderate activity against seven bacteria and three yeasts, with inhibition zone ranging from 11 to 20 mm and minimum inhibitory concentration (MIC) values ranging from 3.75 to 15 mg/ml. The best inhibitory effects were against *Bacillus subtilis*, *Staphylococcus epidermidis* and *Saccharomyces cerevisiae*.



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**ESTABLISHMENT OF CALLUS AND CELL SUSPENSION CULTURE
OF *SCROPHULARIA STRIATA* BOISS. FOR ECHINACOSIDE
PRODUCTION**

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The objective of this work was the optimization of callus and cell suspension culture conditions in *Scrophularia striata* Boiss. for echinacoside production. *S. striata* (scrophulariaceae) is one of the native traditional medicinal plants in Iran [1] which contains Phenylethanoid glycoside [3]. Phenylethanoid glycosides (PeG) are pharmaceutical components isolated from *S. striata* and chiefly include echinacoside and acteoside. Echinacoside demonstrated various bioactivities such as: antioxidative, antimicrobial, cell apoptosis regulation, neuroprotective, nitric oxide radical scavenging and antihepatotoxic activities [2]. With the increasing demand for this product and the rapid decline in *S. striata* plants, cell culture would be an attractive means of its production. In this study leaf and stem explants were used for callus induction on Murashige and Skooge medium supplemented with 3% (w/v) sucrose, NAA (0, 0.25, 0.5, 2, 4 mg/L), BA (0, 0.25, 0.5, 2 mg/L) solidified with 7 g /L agar, pH: 5.8. They were incubated in darkness at 25^{0C}. After 7 days the calli were emerged and subcultured every 2 weeks. The results showed the highest echinacoside production was in MS medium supplemented with 3% (w/v) sucrose, 2 mg/ L NAA, 2 mg/L BA. Also, we found echinacoside production in cell culture of *S. striata* and it detected by HPLC method. In conclusion, cell culture could be considered as an alternative, continuous and reliable source to produce the large-scale this important phenylethanoid glycoside from *S. striata*.

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**DETERMINATION FATTY ACIDS IN *MORINGA PEREGRINA* OIL
FROM DIFFERENT LOCATION IN SISTAN AND BALOCHESTAN
PROVIANCE**

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Moringa peregrina is one of the species which growing in tropics area and its distribution on south eastern of the country in Hormozghan and Sistan and Balochestan provinces. *Moringa peregrine* is desert shrubs that can grow in areas with little rainfall and it have cost in food, pharmaceutical, environmental, industrial and economic values. The purpose of this study, determination of fatty acids in *Moringa peregrina* seed oil from different location in Sistan and Balochestan province in 2009. Five samples were collected from five natural research stations. Samples extracted by solvent and cold press for yield content in seed used Soxhlet method. Oil content obtained from Tong Fonoj station were 54.6%, from Keneshky station were 50.4%, from Bent station were 52.4%, from Begaband station were 53.2%, and from Dorahy Chanf were 53.6% respectively. The results show the amount of fatty acids, were oleic acid from 71.5 up to 74%, palmitic acid were from 12.6 up to 14.7%, Iso-oleic acid were from 3.6 up to 4.5%, palmitoleic acid were from 3.3 up to 4.7%, stearic acid were from 1.9 up to 2.4%, Behenic acid were from 0.9 upto 1.5%, gadoleic acid were from 0.4 up to 10.9% and Arachidonic acid were from 0.4 up to 1.3% are variable. Over 90 percent of oil consumed in the country comes from abroad and with review of research into the causes and rates of fatty acids in *Moringa peregrine* seed with wide food consumption can be as a new source for the production Vegetable oil.



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**EFFECTS OF DIFFERENT CULTURE MEDIA ON ROOTING OF
PASSIFLORA INCARNATA STEM CUTTINGS**

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Medicinal plants are a primary or supplementary element of 80% of the world's health care practices. More often, plant species are hard to propagate sexually and they also show complexities and undesirable characters. In the present study, the rooting behavior was evaluated for stem cuttings of two of medicinally important plant *P. incarnata* among three treatments of rooting media which includes sand, coarse perlite (2-5mm), perlite medium (1-2mm), fine pearlier (0.5-1mm), (The combination of 1part sand+2part perlite medium), (The combination of 1part sand+2part perlite medium+1part peat mass) and peat mass. The experiment was done in a factorial design with 5 replications. There were significant differences at the 5% level in root production between the combination of 1part sand+2part perlite medium+1part peat mass and other treatments. From results of this study it can be concluded that vegetative propagation of this important plant is feasible through application of stem cuttings on perlite medium propagation bed, better than other in vivo media under controlled conditions.

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SEASONAL FLUCTUATION OF THE ESSENTIAL OIL AND
1,8-CINEOLE COMPOUND IN ADAPTED *EUCALYPTUS* SPECIES
IN FARS PROVINCE

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Eucalyptus trees which is its natural habitat, are grown in the forest of fast-growing species are considered native to the Pacific, especially Australia and about 200 years in countries other than Australia. Such a tree over 100 years ago came to Iran in the south and that it was a good environment was cultivated. Meanwhile Research Institute of Forests and Rangelands in 1347 have began activity research the compatibility of various species of *eucalyptus* in different parts of Iran (Khuzestan, Fars, Kermanshah, Golestan, Gilan, Mazandaran and Lorestan) began. The purpose of this study on Seasonal Fluctuation of the essential oil and its major components in adapted *Eucalyptus* species in Fars province the Central regions of Iran. 23 Species of *eucalyptus* leaves, collected from Fars province on middle of each season for two years (2008 and 2009) and essential oils extracted by hydrodistillation method (Clevenger apparatus) and analyzed and identified by gas chromatography (GC) and gas chromatography coupled to mass spectrometers (GC / MS). The results showed that in every region of some species while in season or certain seasons of the highest yields and quality are essential due to the high amount of oil and the amount of a compound 1,8-cineol in it advisable to cultivate its vast are essential to making the region. Best results find in Fars Province were: *E. calcicultrix* (Miq.) Blakely; *E. camaldulensis* var. *camaldulensis* Dehnh. ; *E. cornuta* ; *E. fruticetorum* ; *E. intertexta* R.T.Baker ; *E. largiflorens* F. Muell. ; *E. lesouefii* ; *E. longicornis* F. Muell. ; *E. oleosa* F.Muell.; *E. rudis* Endl. ; *E. salmonophloia* F.Muell. ; *E. salubaris* ; *E. stricklandii* Maiden; *E. viridis* , oil percentage obtained in different species from different seasons from lowest 0.1% up to 6.8% in 2007 and from lowest 0.3% up to 5.8% in 2008. *E. oleosa* F. Muell. In Shvsny, mamasani location have a highest yield oils in autumn (5.2% - 6.4%) and the highest rate of 1,8 - cineole in Winter (91.4% - 94%), the best time to harvest and can recommend the best way to be cultivated.



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**CYTOGENETIC VARIABILITY AND NEW CHROMOSOME NUMBER
REPORTS IN SOME SPECIES OF *HELICHRYSUM* MILL.
(COMPOSITAE)**

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In this research chromosome counts were made for some species of *Helichrysum* Mill. There are 20 species of *Helichrysum* comprises grow in Iran that nine species are endemic [1, 4]. We observed base numbers 6, 7 and 8 for 9 species of this genus. In order to cytological investigation, seed germination, pretreatment, fixation and staining stages have been done and photos were taken with digital camera, then chromosomes were measured with Image Tools software and finally ideograms were designed with Harvard Graphics software. Also, chromosome numbers for the 5 species: *H. artemisioides*, *H. davisianum*, *H. glanduliferum*, *H. leucocephalum* and *H. oocephalum* are reported for the first time in the world. In addition, in *H. armenium*, *H. oligocephalum*, *H. plicatum* and *H. rubicundum*, they are according to previous reports [2, 3, 6].

Also, for all species of karyotypic characters such as chromosome long arm length(L) , short arm length(S), total length(TL), ratio of long arm length to short arm length (rvalue), ratio of short arm length to long arm length (arm-ratio), total form percentage (TF%), relative length of shortest chromosome (S%), coefficient of variation (cv), Difference of range of relative length (DRL), were calculated (5). For determination of karyotype symmetry Romero- Zarco method (5) and Stebbins (7) two way tables were used.

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**EFFECTS OF ANTIAGING (*ALOE VERA*, *SATUREJA HORTENSIS*,
TEUCRIUM SCORDIUM) AND MIXTURE OF THEM ON D-
GALACTOSE INDUCED AGING IN MALE MICE**

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Medicinal plants are recognized as sources of natural antioxidants that can protect from biological system oxidative stress. Oxidative stress is one of key elements of aging. The aim of the present study was to investigate the antiaging properties of the lyophilized extract of three herbal medicines including *Aloe vera*, *Teucrium scordium*, and *Satureja hortensis*.

At first male BALA/c mice were treated by D-galactose to become biochemically and pathologically aged. After 2 weeks, animals were divided into 7 groups as follows: Positive control (D-galactose 500 mg/kg for 6 weeks + Vitamin E 200 mg/kg/day, orally for 4 weeks), Treatment groups (500 mg/kg D-galactose per 10 ml drinking water by gavage for 6 weeks plus *Satureja hortensis* (225 mg/kg), *Teucrium scordium* (200 mg/kg) and *Aloe vera* (200 mg/kg), the combination group containing *Satureja hortensis* (225 mg/kg), *Teucrium scordium* (200 mg/kg) and *Aloe vera* (200 mg/kg), all gavaged for 4 weeks. The seventh group was the sham and not given D-galactose.

At the end of treatment, pro inflammatory markers including tumor necrosis factor- α , interlukine-1 β , interlukine-6, NF-kappaB, total antioxidant power (TAP), lipid per oxidation (LPO) and male sex hormones i.e. testosterone and dehydro epiandrosterone -sulfate (DHEA-S) were measured in the blood. Results showed that D-galactose induces a significant oxidative stress and pro inflammatory cascade of aging while all herbs recovered them. Generally, *aloe vera*, showed the best effects in improving aging effects induced by D-galactose. Herbs used in this study have some anti-aging effect on D-galactose-induced model of aging because of their anti oxidative stress potential.



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**EVALUATION OF GERMINATION CHARACTERISTICS OF
FLEATWORT AND PURPLE CONEFLOWER AFFECTED BY
DIFFERENT SALINITY STRESS LEVELS**

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Establishment of seedlings at early growth stages of plants as one of the most important determinants of high yield is severely affected by soil salinity. Therefore, high germination rate and vigorous early growth under salty soils is preferred. In order to examine the impact of different salinity stress levels on germination characteristics and preliminary growth on fleawort (*Plantago ovata* L.) and purple coneflower (*Echinacea purpurea* L.), a laboratory experiment was conducted based on completely randomized design with four replications at the College of Agriculture, Ferdowsi University of Mashhad during 2012. Salinity levels included zero, 5, 10 and 15 dS.m⁻¹ NaCl. The results indicated that the effects of different drought stress levels was significant ($p \leq 0.01$) on germination rate (GR), final germination, plumule and radicle lengths and seed vigor index (SVI) of fleawort and purple coneflower. By increasing in salinity stress from zero to 15 dS.m⁻¹ decreased GR from 99 to 35 1/days in fleawort and from 88 to 22 1/days in purple coneflower. These decreasing amounts for SIV were up to 100% to control for fleawort and purple coneflower. So, it concluded that salinity stress decreased germination characteristics and preliminary growth of fleawort and purple coneflower due to disordering in hydrolysis and enzymathic processes. Also, comparing the effect of salinity stress on germination characteristics of these two species denoted that purple coneflower is a sensitive species to salinity stress than fleawort.

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**THE EFFECT OF PLANT REGULATORS ON CALLUS INDUCTION OF
THYME (*THYMUS VULGARIS*.L AND *THYMUS DAENENSIS*)**

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Thyme is an aromatic medicinal plant native to the Mediterranean region. *Thymus* spp. serve as a natural source of phenolic oils, oleoresins (Lawrence and Tucker 2002) and are extensively used both for medicinal and non-medicinal purposes. In order to improve the callus induction of thyme, one experiment was carried out in tissue culture laboratory of Zanjan university with two different species of thymes, *Thymes vulgaris* L. and *Thymus daenensis* (lamiaceae). The research was conducted using factorial experiments based on randomized complete design. Data analysis was done with MSTATC software. Callus using various *In vitro*-grown plantlets (shoot, root, leaf and bud) was established on Murashige and Skoog (MS) medium supplemented with Kinetin (0, 0.5, 1 mgL⁻¹) and 2,4-D (0, 0.5, 1 mgL⁻¹). All explants were incubated under a 16 h (light)/8 h (dark) photoperiod at 23 ± 2°C for two months. Subculture carried out with two weeks intervals. Green calli was induced on explants after one subculture. The best callus induction were obtained using bud plantlet on MS media containing 0.5 mgL⁻¹ Kinetin without 2,4-D.

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**EFFECTS OF DIFFERENT SALINITY LEVELS OF NaCl AND CaCl₂
ON GERMINATION OF SAFFLOWER (*CARTHAMUS TINCTORIUS* L.)**

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Salinity stress is one of restricting factor of yield in plants. Present study was done to evaluation the effects of NaCl with 3 levels (14.61, 20.45 and 25.25 dS m⁻¹) and CaCl₂ with 3 levels (36, 51.14 and 66.14 dS m⁻¹) in compare to control on germination and seedling growth of safflower seeds using completely randomized designs. Results were shown significant effect of salinity type on percentage and velocity of germination. Germination percentage was equal in all levels of NaCl and control while CaCl₂ reduce frequency of germination percentage. Also germination velocity in NaCl treatment was less than control. Root length in all treatment of both salinity was less than control significantly, while among different levels of both salinity there wasn't any significant different about this item. Both type of salinity and concentration of salinity had significant effect on stem length. CaCl₂ reduce stem length more than NaCl. Also high concentration of both salinity types reduced this item more than low concentration of salinity. Results were shown that stem length was reduced more than root length of seedling in this plant under salinity stress.

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**INVESTIGATION OF POSSIBLE ANTI-AFLATOXICOSIS
PROPERTIES OF SAVORY ESSENTIAL OIL**

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Mycotoxins are secondary metabolites produced by certain fungal organisms. Aflatoxins, particularly aflatoxin B1 proposed as an important feed contaminant of livestock and poultry industry. Aflatoxin B1 may exert its deleterious effects via acceleration of oxidative reactions. It has been reported that thymol and carvacrol compounds found in many medicinal plants have strong anti-oxidant properties. Considering the beneficial effects of the *Satureja khuzistanica* as a rich source of essential oils with anti-oxidative properties, the aim of this study was to study the possible effect of savory essential oil on quails under aflatoxicosis. A total of 90 quails with 21 days of age were divided into 5 experimental groups, each with 3 replications. Treatments were as follows: 1 - Negative control, 2 - Positive control-fed diet contaminated with aflatoxin B1 (2.5 ppm), 3- Contaminated feed + 300 ppm savory essential oil 4- Contaminated feed + 600 ppm savory essential oils 5- Contaminated feed + 900 ppm savory essential oils. At the end of trial on day 49, four birds per experimental group were randomly selected for sample collection. Some serum metabolites and hepatic enzymes were evaluated. Administration of savory oil changed concentration of serum uric acid, cholesterol, HDL, LDL, triglyceride, calcium, zinc and albumin ($P < 0.05$). The activity of serum alanine amino-transferase, alkaline phosphatase, gamma glutamyl transferase did not change by treatments. In conclusion the results of present experiment showed partial alleviation of aflatoxicosis when quails diets were supplemented with savory essential oil.



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**PHYTOCHEMICAL ANALYSIS AND ANTIBACTERIAL EFFECT OF
ACHILLEA TENUIFOLI LAM.**

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Asteraceae, the largest family of angiosperms, comprises about 1500 genera and 23000 species, distributed in three subfamilies and seventeen tribes. The genus *Achillea* is composed of 115 species of perennial herbs, all native to temperate regions of the northern hemisphere [1]. Aerial parts of different species of this genus are widely used in folk medicine for preparation of herbal teas with antiphlogistic and spasmolytic activity [2]. One document published about two centuries ago as Makhzan-OI-Advieh, recommended it for bladder stone and urinary obstruction [3]. In recent studies, the extract of this genus exhibits pharmacological activities like anti-inflammatory and antiallergic [4], antihelminthic, cholagogue, antibacterial and antioxidant properties. Therefore, the many uses of *Achillea* species have created wide interest in their phytochemistry and *Achillea tenuifolia* Lam., a perennial herb, distributed in some regions of Iran [5] was candidate for phytochemical analysis. The methanolic extract of *Achillea tenuifolia* Lam. afforded a dichloromethane fraction from which Stearic acid, Lupeol, β -sitosterol, Methyl gallate, besides three flavones have been isolated for the first time and the structures of the isolated compounds were elucidated based on NMR (one dimensional and two dimensional techniques), IR and MS spectra. In case of salvigenin (one of the flavones) effect of solvent on ¹H-NMR spectra have been studied. Although considering the numerous uses of this genus in folk medicine, the antibacterial effect of plant in comparison with some antibiotics is under investigation and the preliminary results showed interesting results. Surprisingly, in some cases the extract has more activity than antibiotics.

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**CHANGES IN ESSENTIAL OILS CONTENT AND CHEMICAL
COMPOSITION OF *ARTEMISIA SIEBERI* DURING DIFFERENT
PHENOLOGICAL STAGES**

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The variations in content and compositions of *Artemisia sieberi* (Asteraceae) essential oil were examined at different phenological stages (i.e vegetative, floral budding, full flowering, after flowering). The essential oils of air-dried samples were extracted by hydrodistillation. The yield of essential oils (w/w %) were 1.65, 1.85, 2.29 and 2.71 % at vegetative, floral budding, full flowering, after flowering stages respectively. The essential oils were analyzed by GC and GC_MS. A total of 56, 65, 65, and 68 components were identified and quantified at the above mentioned stages, respectively. The essential oil content showed significant increase at after flowering stage. Three components, 1, 8-cineole(21.1-23.98), camphor(11.77-18.33) and α -thujone (8.06-13.08) were the major oil constituents of all growth stages.

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**THE EFFECT OF IMIDACLOPRID AND PLANT EXTRACT ON
BIOLOGICAL PARAMETRES OF *CHRYSOPERLA CARNEA*
(STEPHENS) (NEU. CHRYSOPIDAE) IN LABORATORY CONDITION**

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Present study conducted to evaluate the side effects of imidacloprid and plant extracts; *Calotropis procera*, *Lawsonia inermis* and *Ricinus Communis* on biological parameters *Chrysoperla carnea* (Stephens) in controlled condition. 1rd instars larvae treated with insecticide concentrations and 750 µl/ml concentration of extracts by Spray tower method. Results showed that the min total larval duration when 1rd instars larvae treated by *R. Communis* (12.77±0.319 days) and the max by imidacloprid (14.25±0.359 days) which showed imidacloprid has the most inhibition on 1rd instars larvae. Also the min mean of adult duration was 42.008±0.773 for *R. Communis* and the max 51.04±2.036 for imidacloprid.

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INVESTIGATION ON IMIDACLOPRID AND PLANT EXTRACTS
EFFECTS ON STABLE POPULATION GROWTH PARAMETERS OF
CHRYSOPERLA CARNEA (STEPHENS)

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Demographic toxicology is a common method for investigation on the sublethal effects of insecticides on natural enemies. Side effects of imidacloprid and three plant extracts; *Calotropis procera*, *Lawsonia inermis* and *Ricinus Communis* were evaluated on stable population growth parameters of *Chrysoperla carnea* (Stephens) in controlled condition in this study. Firstly, 100 1st instars larvae treated by Spray tower method. Results showed significant differences ($p \leq 0.01$) between treatments for gross reproductive rate (GRR), net reproductive rates (R_0), intrinsic rate of increase (r), finite rate of increase (λ) and doubling time (DT) parameters. Also, the mean of r_m were max in *C. procera* and min in *L. inermis*. Based upon our hypothesis, extract of *C. procera* is the best choice for some IPM programs because of its immunity on *C. carnea* as biological agents.

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**DETERMINATION OF INHIBITORY EFFECT OF *ANTHEMIS GAYANA*
FLOWER ESSENTIAL OIL AGAINST PATHOGENIC FUNGI**

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Infection disease always were important worry of human and to focus ones attention extra number of owners the medical and laboratory profession [1]. Traditional plants play an essential role in health care. The aim of this study was to determine the antifungal effects of *Anthemis gayana* flowers essential oil against of *Candida albicans* different strains. In this study flowers essential oil were obtained by hydrodistillation using cleverger apparatus for 3h [2,3], and were tested in vitro against 10 fungi strains (SC-2-a₃; SC-2-a₆; SC-2-a₁₂; SC-2-a₁₆; SC-2-a₁₇; C.589; C.590; C.592; C.593; C.596). Two concentration of flower essential oil (%10, %20) were prepared by using DMSO solvent and then antimicrobial activity was tested by using Agar well diffusion and Dilution test, and data were analyzed using AVONA test in the P< 0.001[4,5]. The results demonstrated that inhibition zone of flowers essential oil were 30, 36, 30, 30, 32, 30, 30, 29, 29, 30 mm respectively. The minimum inhibitory concentration was 8, 8, 9, 8, 8, 9, 8, 8, 8, 8 mg/ml respectively. This study is the first research on antifungal activity of *Anthemis gayana* flowers essential oil, Hence, this plant may be used further as medicinal plant against *Candida* spp. Therefore we will be able perform researches with extraction of this plant effective compound for the treatment of infectious disease.

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**THE EFFECT OF *DOREMA AUCHERI*- HYDROALCOHOLIC EXTRACT
ON BLOOD GLUCOSE, INSULIN AND LEPTIN IN STZ-
NICOTINAMIDE INDUCED TYPE 2 DIABETE IN MALE RATS
MODEL OF DIABETES.**

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Type II diabetes is the most common disease caused by metabolic disorders And is overburdened by many today as there is a huge problem worldwide. *Dorema aucheri* flavonoid-rich plant is the first plant of the family Apiaceae that this material can inspire. During the pre-diabetic Byvflavnvyydha with therapeutic effects on diabetes control in diabetes-prone mice has been shown to Treatment with flavonoids significantly delay the onset of diabetes, the survival of mice and reduced incidence of diabetes is. In this study, 60 adult male rats (gr10 ± 180) to 6 groups flowing control (saline), diabetes, positive control (diabetic recipients Glibenclamide) and diabetic groups receiving doses of extracts 100, 200 and 400 (mg /kg /day) groups then groups the investigated extracts of *Dorema aucheri* daily (5 days a week) for 4 weeks (gavage). At the end of the study, blood glucose, insulin and leptin in the serum was measured by special kits. The results showed that lower blood glucose and insulin and leptin levels in groups treated with extract *Dorema aucheri* has been significantly increased as compared to diabetic control group. This study showed that the anti-diabetic properties of the hydroalcoholic extract and ethanolic extract *Dorema aucheri* there can be effective in controlling and reducing blood glucose levels in diabetic animals.

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**ANTIOXIDANT, ANTIMICROBIAL AND ANTITUMOR ACTIVITY
EVALUATION OF TOTAL METHANOLIC EXTRACTS FROM
DENDROSTELLERA LESSERTII (WIKSTR.) VAN TIEGH. FROM
KASHAN**

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Aromatic plants have been used since ancient times for their preservative and medicinal properties, and to impart aroma and flavor to food. The pharmaceutical properties of aromatic plants are partially attributed to essential oils. In this research, *Dendrostellera lessertii* (Wikstr.) Van Tiegh. from Thymelaeaceae family from Kashan was investigated. The essential oils of aerial parts of this plant has been extracted by simultaneous steam distillation and extraction and has been studied by GC-MS. The present study was conducted to evaluate the in vitro antioxidant properties of total methanol extract from aerial part of *Dendrostellera lessertii*. The antioxidative potential of the samples were evaluated using two different methods: a) inhibition of 2, 2-diphenyl-1-picryl hydrazyl (DPPH) stable free radical, b) β -carotene-linoleic acid assay. The methanolic extract showed low effectiveness in DPPH assay with an IC₅₀ value of 142.35 ± 1.90 µg/ml, comparable to that of synthetic standard antioxidant butylated hydroxy toluene (BHT, IC₅₀ = 17.06 ± 0.73 µg/ml). In the β -carotene/linoleic acid assay, the methanol extract was exhibited moderate linoleic acid oxidation inhibition percentage (61.32%) which was only slightly lower than that shown by BHT (102.34%). Total phenolic contents of methanolic extract of *D. lessertii* was (37.48 ± 3.70 µg), showing a direct relationship between antioxidant activity and phenolic compounds contents. The methanol extract of the plant also showed considerable antimicrobial activity against most of tested microorganisms but the plant essential oil was inactive in this test [1-2]. The methanol extract was screened by the brine shrimp lethality assay and showed major toxicity in this test (LC₅₀= 10 µg/ml) [3].

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IN VITRO RADICAL SCAVENGING ACTIVITY OF *ZATARIA MULTIFLORA* ACCESSIONS IN RELATION TO THEIR ROSMARINIC ACID CONTENT

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Reactive oxygen species (ROS) play a critical role in cardiovascular diseases, inflammatory diseases, neurodegenerative disorders, cancer and aging [1]. The protective effects of plants have long been attributed to their antioxidant compounds, such as polyphenols [2]. In the present study, the variation of antioxidant activity and radical scavenging potential of methanolic extracts from the aerial parts of 28 wild-growing accessions of *Zataria multiflora* was investigated by using 3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical scavenging property. *Zataria multiflora* Boiss (Lamiaceae), with the common Persian name of “Avishan Shirazi”, is an aromatic perennial shrub which grows wild, on rocky and gravelly slopes, from southern to central regions of Iran [3]. The amount of rosmarinic acid (RA) in cited accessions was also determined by HPLC. Our results revealed that RA content and total antioxidant activity of all accessions varied from 134 to 759.6 mg/100g DW and 506 to 1999 μ mol T/g, respectively. A linear positive relationship existed between RA content and antioxidant activity of the tested plant accessions ($R^2=0.65$). In conclusion the present study indicates that *Z. multiflora* can be a potential source of natural antioxidant.

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**TOTAL PHENOLIC AND TOTAL FLAVONOID CONTENTS,
ANTIOXIDANT ACTIVITY OF *ZATARIA MULTIFLORA* ACCESSIONS
FROM IRAN**

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The potential of the antioxidant constituents of plant materials for the maintenance of health and protection from coronary heart disease and cancer is raising interest among scientists and food manufacturers as consumers move toward functional foods with specific health effects [1]. The antioxidative effect is mainly due to phenolic components, such as flavonoids (Pietta, 1998), phenolic acids, and phenolic diterpenes [2]. In the present study, methanolic extracts of 28 wild-growing accessions of *Zataria multiflora* have been measured by DPPH (1,1-diphenyl, 2-picrylhydrazyl radical) method for antioxidant activity, Folin-Ciocalteu method for phenolic content and AlCl₃ colorimetric assay for flavonoid contents, respectively. Our results revealed that antioxidant activity; total phenolic and flavonoid contents in the methanolic extracts of *Z. multiflora* accessions ranged from 3.22 to 15.51, 550 to 1283 mg gallic acid/g DW and 104 to 365 mg QE/g DW, respectively. Iranian *Z. multiflora* accessions possess valuable antioxidant properties for pharmaceutical and food industries.

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**THE EFFECTS OF DIFFERENT ORGANIC FERTILIZERS ON
CHLOROPHYLL AND SOME CHARACTERISTICS OF BASIL
MEDICINAL PLANTS (*OCIMUM BASILICUM*)**

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Application of different kinds of compost to agricultural soils is becoming an increasingly important global practice to enhance and sustain soil organic matter (SOM) and fertility levels [1]. In order to investigate the effects different types of organic fertilizers and their percentage on initiate growth of Basil, an experiment was conducted in factorial arranged in randomized complete block design with three replications in the University of Torbat Heydariyeh. Treatments were including of different organic fertilizers (non-fertilizer, manure, ordinary compost, granular and vermicompost) in six levels and various percentages of fertilizer (10%, 20%, 30% and 40%) in four levels. Some morphological aspects such as number of leaf per plant, leaf area index, fresh and dry weight of root and shoot and also chlorophylls content of plants were measured. Results of statistical analysis showed that highest number of leaf per plant, leaf area index and chlorophylls is related to the granular compost and there are no significant differences between fertilizer treatments in aspect of fresh and dry weight of root and shoot. Among various percentages of fertilizers there had not seen any significant differences between treatments about fresh and dry weight of root and shoot and 30% by volume treatment had the best effect on leaf number, leaf area index and chlorophyll content than other percentages treatments. Stewart et al. (1998) pointed out that compost treatments positively affected crop yield and plant nutrition uptake due to reducing the volume weight, soil clod and slide layer formation, and increasing infiltration rate, water holding capacity [2]. According to the results of this study, 30% by volume of granular compost had the best results in all characteristics and were suggested.

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**BIOLOGICAL CONTROL OF THREE WEEDS BY ALLELOPATHIC
PROPERTIES OF *ALOE VERA***

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In conventional agriculture, weed control by herbicides is an expensive practice and can also have a negative effect on the environment. Allelopathy permits sustainable weed management while reducing the impact of agriculture on the environment. In this study, effects of different concentrations of aqueous extract taken from *Aloe Vera* medicinal plant on germination process of three weeds were investigated. The experiment conducted in factorial arranged in randomized complete block design with three replications. Different concentrations of aqueous extracts of *Aloe Vera* in five levels (including none-extract, 25, 50, 75 and 100 percent) and three weeds (including Plantain, Purslane and Iambsquarter) were studied. Some characteristics such as germination rate and percentage, plumule and radicle length were measured. Results of statistical analysis revealed that highest germination percentage achieved from none-extract treatments. Plantain has the highest germination rate in all extract concentrations among three weeds. The variation in germination of different species might be due to the variation of genetics of these three weeds. These results are in agreement with those of Nandal *et al.* (1999) and Patel *et al.* (2002) who all observed reduction in germination percentage with extract/leachates application to wheat seed. *Aloe Vera* extract significantly reduced plumule and radicle length of Plantain, Purslane. Means of plumule and radicle length on investigated species in 75% and 100% concentrations treatments were lower than other concentrations, which showed allelopathic mediums in higher *Aloe Vera* aqueous extract concentrations. Reducing of radicle to plumule length rate is showing sensitivity of radicle to growth inhibiting substances. It seems from agronomic point of view that weeds management by allelopathic plants can quickly spread as an alternative or complement to other management techniques. Giving the increasing interest in using conservation tillage methods and crop residue on soil conservation, especially where water shortage and precipitation are encountered, roles of these allelopathic substances in weed control are highlighted.

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ALLELOPATHIC EFFECT OF ARTEMISIA SP. ON GERMINATION OF PURSLANE (*PORTULACAOLERACEA* L.)

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Present study was carried out with application of *Artemisia* sp. on purslane (*Portulacaoleracea*L.), to determine the germination rate of purslane at the greenhouse in the department of cultivation and development institute of medical plants, ACECR, Karaj, Iran. The experiments were conducted in a completely randomized design with a factorial arrangement in three replications. The treatments were three species of *Artemisia* (*A. dracunculoides*, *A. vulgaris*, *A. absinthium*), five levels of plant extract (0, 1, 5, 10 and 15 percent) and 4 organs of growing part (flower, leaf, root and stem). A conclusion can be drawn that in our experiments *A. vulgaris* had the best effect on all tested factors (germination rate, coleoptile length, radicle length and coleoptile fresh weight). 15 percent of plant extract caused a reduction in germination rate and radicle length and 10 percent of plant extract showed the best results on coleoptile fresh weight and length. Results indicated that all tested factors were significantly reduced in flower treatment. The objective of the paper was to determine the allelopathic effect of *Artemisia* sp. on germination and seedling growth of purslane.



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**EFFECT OF THREE GROCERY HERBS ON GROWTH OF
KLEBSIELLA PNEUMONIAE IN VITRO**

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Regard to using medicinal plants in medical therapy, it has specific role in treatment of diseases. Bacterial resistance to chemical antibiotics, have been elevated irregular consumption of herbs in the society. Groceries are the closer source for provision of herbal medicine in our society. In this study we evaluated the effect of three grocery herbs: *Chrysanthemum parthenium*, *Astragalus hamosus* and *Teucrium polium* on the growth of *Klebsiella pneumoniae* in vitro based on their antibacterial effect in traditional medicine. In this study we used reference bacteria which prepared from microbiology laboratory of Guilan university of medical Sciences. Effect of hydro-alcoholic extract of all three herbs on growth of bacteria has been evaluated by minimal inhibitory concentration (MIC) and serial dilution method and compared with control tubes. Extract in range of 10 to 400µg/µl of all three herbs didn't avoid from growth of bacteria in MIC (Minimal Inhibitory Concentration). Concentration 200µg/µl of *Astragalus hamosus* has an intermediate suspicious effect but it was not significant. Although herbs are suitable drugs for prevention and treatment of diseases in traditional medicine but there is no surveillance on the dispensation of herbs in groceries. Comparison of natural confirmed herbs and grocery herbs in the same name suggested [1, 2].

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ASSESSMENT OF THE NITROGEN AND COMPOST DIFFERENT LEVELS EFFECTS ON QUALITATIVE AND QUANTITATIVE PERFORMANCE OF *CALENDULA OFFICINALIS L.*

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In order to investigate the effects of nitrogen and compost different levels on qualitative and quantitative performance of *Calendula officinalis L.* herb, an experiment was carried out in the research field of Chalous Azad University in 2011-2012. The experiment was done in factorial form as a randomized complete block design, in three replicates. Treatments consisted of nitrogen and compost. Considered nitrogen levels consisted of $N_0=0$, $N_1=50$, $N_2=100$ kg/ha and compost levels were including $C_0=0$, $C_1=6$, $C_2=12$ ton/ha. Investigated characteristics consisted of flower dry weight, number of flowers in plant, flower diameter, flavanoid content. The results showed, nitrogen and compost treatments had statistically significant influence ($p \leq 0.01$) on studied characteristics. Flower dry weight, flower diameter and number of flower in plant characteristics has been studied in eight harvest; as, the performance of these characteristics had increasing procedure from the first harvest up to the fourth harvest; and, in the fourth harvest, it has reached to its maximum level and from fifth harvest, it had decreasing procedure. As, up to the fourth harvest, the maximum flower dry weight, flower diameter and number of flower in plant obtained by $C_1 \times N_2$ ($C_1=6$ ton/ha compost and $N_2=100$ kg/ha nitrogen) treatment and from fifth up to the eighth harvest, it was obtained by $C_2 \times N_2$ ($C_2=12$ ton/ha compost and $N_2=100$ kg/ha nitrogen) treatment. Also, the maximum flavanoid content obtained by $C_2 \times N_1$ ($C_2=12$ ton/ha compost $N_1=50$ kg/ha nitrogen) treatment. In conclusion, application of compost as a biological fertilizer plays an effective role in enhancement of quantitative performance and increment of the flavanoid content of the plant [1, 2].

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CYTOTOXIC EFFECT OF PLANT EXTRACTS OF *AMMI VISNAGA* IN HELA AND MCF7 CELL LINES

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The discovery of new materials such as anti-microbial and anti-viral and anti-cancer known among plants or those who have recently been discovered, can help to treat diseases. Since many plants are going in our country, study identification of the active compounds of medicinal plants could be a positive step in the optimal utilization of the national wealth is valued. In this study, the cytotoxic effects of plant extracts on cell *Ammi visnaga* cancer Hela and MCF7 were analyzed.

Different concentrations of ethanol extract of the plant *Ammi visnaga* on blood cells and cultured for 72 hours and is effective. The cytotoxicity was evaluated by MTT test. Results are reported as IC₅₀. This study showed that the extract in different concentrations of *Ammi visnaga* cytotoxic effect on Hela cell lines, respectively. The extract at a concentration of 2.5mg/ml ($p \leq 0.02$ **) and 0.625, 1.25, 5, 7.5 mg / ml ($p \leq 0.05$ *) significantly is different from the control group. Percentage growth inhibition of Hela cells with extract concentration increased. *Ammi visnaga* extract containing various concentrations of the cytotoxic effect on cancer cell line MCF7 is. The extract concentrations 1.25 mg/ml ($p \leq 0.05$ *) and 2.5, 5, 7.5, 10 mg/ml ($p \leq 0.02$ **) significantly is different from the control group. IC₅₀ for extracts of *Ammi visnaga* for Hela, 0.57 mg /ml for MCF7, 2mg/ml was measured. The results suggest that the inhibitory effect of alcoholic extract of *Ammi visnaga* on cell growth of MCF7 and Hela cell lines.

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**DETERMINATION OF TOTAL FLAVONOID AND TANNIC
CONTENTS OF SIX IRANIAN POMEGRANATE FLOWERS**

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Six species of pomegranate (*Punica granatum* L.) flowers (Malase Yazdi, Rabbabe Fars, Shisheh Gape Ferdows, Daneh Siyahe Esfahan, Gojaghe Ghom and Golnar) were studied for the quantification of the total flavonoid contents by spectrophotometer. The total flavonoid compounds were measured using the Catechin reagent. The results of analyzing flavonoid compounds showed that Qojaq has the highest value, 2.59 mg/g, and Golnar has the lowest value, 1.14 mg/g [1].

In analyzing tannin components, the quantification of the total tannic contents by titration. The total tannic contents were measured using the Indigo Carmin reagent. It has been showed that the highest value is of Rabbab pomegranate, 2.03 percent, and the lowest value belongs to Golnar, 1.06 percent [2]. The results showed that pomegranate flowers can be introduced as a potent source of natural antioxidants.

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**INFLUENCE OF ELEVATION ON MORPHOLOGICAL AND
PHYSIOLOGICAL FEATURES OF LOCAL POPULATIONS OF
MOUNTAIN PRIDE IN ZANJAN**

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Influence of elevation on morphological features of mountain pride was studied in Zanzan province. Thirty six plants were collected from three different elevations (2300, 2350 and 2400 m) in three replications using plots and the related data were recorded. Samples were transported to the laboratory and analyzed. Geographical information of each elevation was recorded by GPS. Analysis of variance showed that fresh leaf weight and plants diameter was significantly difference at $P \leq 0.05$ among elevations. Mean comparison showed that plant height, stem diameter, stem elongation, fresh leaf weight, fresh stem weight, fresh inflorescence weight, canopy diameter and main inflorescence diameter were higher in 2350 m elevation when compared to the other elevations. However, the number of plant umbellet and leaf were higher in 2400 m, while the internal angle of lateral stem was larger in 2300 m. According to the results, plants of the 2400 m elevation had the highest shoot yield compared with other areas.



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**INFLUENCE OF ELEVATION ON MORPHOLOGICAL AND
PHYSIOLOGICAL FEATURES OF LOCAL POPULATIONS OF
MOUNTAIN PRIDE IN TAROM**

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Influence of elevation on morphological features of mountain pride was studied in Tarom province. Thirty six plants were collected from three different elevations (2218, 2387 and 2447 m) in three replications using plots and the related data were recorded. Samples were transported to the laboratory and analyzed. Geographical information of each elevation was recorded by GPS. Analysis of variance showed that plant height was significantly difference at $P \leq 0.01$ and fresh stem weight and fresh inflorescence weight were significantly difference at $P \leq 0.05$ among elevations. Mean comparison showed that plant height, stem diameter, stem elongation, fresh leaf weight, fresh stem weight, fresh inflorescence weight, canopy diameter and main inflorescence diameter were higher in 2447 m elevation when compared to the other elevations. However, the number of plant umbellet and leaf were higher in 2387 m, while the internal angle of lateral stem was larger in 2218 m. According to the results, plants of the 2447 m elevation had the highest shoot yield compared with other areas.



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STUDYING MEDICAL PLANT OF FERULA ASSA FOETIDA AND ITS CHARACTERISTICS, ECONOMICAL IMPORTANCE, EXPORT AND GLOBAL MARKETING IN SOUTH KHORASAN PROVINCE – IRAN

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Medicinal plants are an important element of medical system. These resources are usually regarded as part of cultural traditional knowledge. Anghose – in Persian - [*Ferula assa - foetida* L. (Apiaceae)] was well knowing in fifteen century by people. This plants are used both for medicinal and non-medicinal purposes. Iran is the one of the most important producers of this plant in the world. Also *Ferula assa-foetida* L. (Apiaceae) is one of the most important endangered medicinal plants, which is rare in nature due to poor seed germination. This plant is a medicinal plant indigenous to Iran and Afghanistan and one of the most important among the thirty species of *Ferula* distributed in Iran. It is an herbaceous and perennial plant that grows up to 2 m high. One part used is an oleo-gum resin, called asa-foetida or anghouzeh in Persian, obtained by incision from the roots. It has been reported in Iranian folk medicine to be antispasmodic, aromatic, carminative, digestive, expectorant, laxative, sedative, nerving, analgesic, anthelmintic, aphrodisiac, antiseptic and also has good effects on male fertility and sexual functioning in rats and in man. The demand for medicinal plants has increased globally due to the resurgence of interest in and acceptance of herbal medicine. Most of the demand is being met through collection of large quantities of medicinal plants and plant parts from wild populations. The methods of extraction employed are almost invariably crude and unsystematic. As a consequence, the rates of exploitation may exceed those of local natural regeneration. Also, the natural habitats are quickly being depleted. There is thus an urgent need to develop and implement conservation strategies for exploited medicinal plant species. The medicinal plant is propagated through seeds. However, its natural populations are very limited in native habitats, which may be due to poor seed germination. Low seed germination in Apiaceae is known. The seed of many medicinal plant species are dormant and do not germinate unless specific environmental signals or events occur. Most production of this valuable fruit, produce in south-khorasan province in extent of 680 ha, that produce 12 ton annually and all of this production export to abroad because of lack of processing industries in this province, and generate incomes of many rural and nomadic households, that in conditions of subsistence agriculture, are dependent to this production. In this article author state results of his research in major problems and aspects of cultivation, exploiting, economics, marketing and etc. of *Ferula assa-foetida* L. (Apiaceae) in south-khorasan province in east-of-Iran as a major producer and exporter of this valuable medicinal plant.



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**PERFORMANC, BIOCHEMISTRY PROFILE OF SERUM AND
ORGANS WEIGHT OF BROILER CHICKENS AS INFLUENCED BY
DIETARY *ECHINACEA PURPUREA* SUPPLEMENTATION**

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New commercial additives of plant origin, considered to be natural products have been proposed to livestock producers [1]. Herbs, spices, and various plant extracts have received increased attention as possible antibiotic growth promoter replacements [2]. Control of the immune system is an alternative way to avoid the use of antibiotics [3]. *Echinacea purpurea* is commonly known as an immune stimulating substance [4]. The purpose of this study was to evaluate the effects of dried *Echinacea purpurea* root (EP) on the growth performance and serum biochemical parameters of broiler chickens. Three hundred 7-d-old male broilers (Ross 308) were randomly allocated into 5 groups: a control group (corn-soybean meal diet), flavophospholipol as an antibiotic group (FL-650 ppm) and groups receiving 0.5, 1.0, or 2.0% dried EP. Body weights of broilers were measured at 21 and 42 days, feed intake was measured weekly and FCR was calculated accordingly. At 42 days of age blood samples (8 samples per treatment) were taken for measuring biochemical analysis. After blood sampling, birds were slaughtered for determination of carcass yield. The result of this experiment indicated that body weight and body weight gain of EP 1% was higher significantly than other groups except FL group at 21 and 42 days old. However, feed intake was not significantly different between groups. On day 42, carcass yield, breast and thigh percentage from broiler fed 0.5, 1 or 2% EP was not significantly different from those of control and FL groups. In addition, weights of internal organs (proventriculus, gizzard, intestine, pancreas, liver, spleen and bursa) were not significantly different among groups. Biochemical parameters of serum including cholesterol, calcium and phosphorus were not affected by dietary EP. However, triglyceride of FL group was lower than other groups. Compared with control group, the 0.5% EP group resulted in lower glucose level and higher aspartate aminotransferase. The results of current experiment suggested that dietary inclusion of 1% dried *Echinacea purpurea* root can be applied as alternatives to antibiotics for broiler diets.

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**EFFECTS OF WATER STRESS ON GERMINATION OF PERSIAN
POPPY**

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Persian poppy (*Papaver bracteatum* Lindly) is considered to be a potential alternative to opium poppy for codeine production without the involvement of morphine, due to its high content of thebaine. Thebaine is a precursor of codeine and can be easily converted to codeine by the pharmaceutical industry. Thebaine is also a starting material for a number of narcotic antagonist drugs. It grows in north of Tehran located in Alborz mountains and in the west of Kurdistan in Iran. The aim of this study was to find effects of water stress on germination of Persian poppy at Institute of Medicinal Plants, ACECR. For the evaluation of the germination under water stress, PEG (6000) solutions were used in 9 levels of osmotic potentials that consist of control, -0.1 to -0.7 MPa and -1.0 MPa. Germination was found to be sensitive to water stress, in a way that the germination was limited to 9% at osmotic potential of -0.4 MPa. Maximum germination (70%) was obtained in control (distilled water) treatment, and then 67.5, 64.5, and 50% at -0.1, -0.2, and -0.3 MPa were observed. Radicle length was 15.4 and 14.6 mm at -0.2 and -0.1 MPa of osmotic potential, respectively and it was 10.6 mm in control. Plumule length was 20.2, 15.4, 13.5 and 8.9 mm in control, -0.1, -0.2 and -0.3 MPa of osmotic potential respectively. In general, better understanding of the germination ecology of Persian poppy will help farmers schedule and improve the management of this crop in farms. Increased knowledge about the germination biology of Persian poppy would facilitate development of effective cultivation programs [1, 2].

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INVESTIGATION OF VERMICOMPOST AND HUMIC ACID EFFECTS
ON QUANTITATIVE QUALITATIVE TRAITS OF
SATUREIA HORTENSIS L.

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In order to investigate vermicompost and humic acid on quantitative qualitative traits of *satureia hortensis* L., an experiment was conducted as factorial based on completely randomized design in Payam Noor of Sabzevar under natural condition. Treatments were vermicompost in three levels (0, 25 and 50 percent in volume) and humic acid in four levels (0, 250, 500 and 750 ppm). The results indicated that vermicompost affected stem height, branch number per m², SPAD reading, dry weight of leaf, stem and root, leaf to stem ratio and shoot yield, significantly, but this treatment had n't significant effect on essential oil percentage and yield of *satureia hortensis* L. The highest stem height and dry weight of leaf stem and root was observed in 50% vermicompost. With increasing vermicompost, shoot yield and essential oil percentage and yield, increased. Effect of humic acid was significant on stem and leaf dry weight and leaf to stem ratio, statistically. The highest shoot yield and essential oil percentage and yield was observed in 500 ppm treatment. In general, results showed that the highest dry weight of leaf, stem and root and essential oil yield was obtained in vermicompost 50% and humic acid 750 ppm, treatment.

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**EFFECT OF *TEUCRIUM POLIUM* (L.) EXTRACT ON BIOLOGICAL
PARAMETER OF *BEMISIA TABACI* (GENN.) UNDER SEMI-FIELD
CONDITION**

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Bemisia tabaci Genn. (Homoptera: Aleyrodidae) is a worldwide economic pest both in the field and in the greenhouse. In this study, the effects of methanol extract of *Teucrium polium* was studied against immature stages of this pest on tomato cultivar Rio Grand–America. Experiments were conducted in a semi-field condition with an average temperature of 25 ± 5 ° C, 50- 60 percent relative humidity and light conditions of 16 hours light and 8 hours dark. Plant extract was sprayed on tomato plants in wooden cages covered with a mesh fabric which contains a population of different stages of sweet potato whitefly. The number of eggs, nymphs and pupae were counted at different days after application of plant extract. The results showed that the effect of extract on eggs, nymphs, all immature stages and total nymphal stage of *B. tabaci* is significant compared to the control and maximum effect of extract was observed on the second day after applying of the extract for eggs and all immature stages and on seventh day for nymphs and total nymphal stage. These findings indicate that the extract of *T. polium* is able to control this insect [1, 2].

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**STUDY OF KARYOLOGICAL CHARACTERISTICS IN SEVERAL
ACCESSIONS OF CASTOR (*RICINUS COMMUNIS L.*)**

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The castor oil plant (*Ricinus communis L.*) is an important crop, used mainly in the production of the castor oil, widely employed in industrial processes as lubricant, but also in the food and pharmaceutical industries [1]. In spite of its economic value, is not cytogenetic studies, including chromosome banding and karyomorphological investigations. In this study karyological characteristics Mitotic chromosomes were studied in meristematic cells of root tips obtained from germinated seeds of five accessions of castor were investigated using Aceto-Iron-Hematoxylin staining [2]. Karyological characteristics including chromosomes number, chromosomes length, long and short arms length, arm ratio index, relative length of chromosomes and total length of chromosome set were measured in 10 mitotic cells. The results showed that all of the five accessions were diploid ($2n=2x=20$) the diploid number observed confirms data previously reported. The karyotype is regular, with small metaphase chromosomes (2.0 to 1.0 μm), most of them submetacentric. Only one pair of NO-chromosomes could be observed, although many nuclei with a maximum lacking.

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**SEED PRIMING IMPROVE THE GERMINATION PERFORMANCE OF
COMMON CHICORY (*CICHORIUM INTYBUS* L.)
UNDER DROUGHT STRESS**

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Various varieties of Common chicory are cultivated for salad leaves, chicons (blanched buds), or for roots (var. sativum), which are baked, ground, and used as a coffee substitute and additive. The aim of this research was to evaluate the effects of priming techniques (Hydro priming, 250 ppm KNO₃ and 500 ppm KNO₃ during 24 hours) on the vigor and germination performance of chicory medicinal plant (*Cichorium intybus* L.var sativum). Seed germination and seedling growth were assessed under controlled conditions that simulated drought stress using polyethylene glycol (PEG) 6000. Seeds were grown in irrigated daily with water (control) or osmotic potential of solution -0.3, -0.6, -0.9 and 1.2 MPa) to induce water stress, for 14 days. Germination percent, root and shoot dry weight, root and shoot length were higher till -0.6 Mpa treatment, but mean germination time and abnormal germination percentage were lower in PEG than control water potential. The effect of priming on morphological and seedling growth were positive significant and 500 ppm KNO₃ increased root and shoot dry matter about 20 percent. Exposure to water potentials below -0.6, -0.9 and 1.2 MPa significantly decreased germination rates, mean germination time (GMT), uniformity of germination (UG) and root and shoot lengths for *Cichorium*, despite slight differences in their sensitivities to osmotic stress. Shoot lengths were more sensitive than root length in all stress. With the lower of stress to -0.6, germination percentage significantly declined with the decrease of ψ and at -0.90 MPa it reduced to less than 50%. Seed priming by 250 ppm KNO₃ enhanced germination and shortened the delay in germination time due to the increase in drought stress. Both shoot and root growths were inhibited at osmotic potentials \leq -0.6 MPa PEG, but by priming this inhibitory effect was blocked. Priming of seed by hydropriming and KNO₃ shortened the delay of MGT at all osmotic potentials, and improved the germination percentage in distilled water (from 52% to 59%) and resistance to drought stress with nearly double germination (from 16% to 29%) at the highest drought stress. Overall, in this research the effects of priming and drought stress on soluble components were determined.

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**EFFECT OF *FUMARIA PARVIFLORA* (LAM.) EXTRACT ON
BIOLOGICAL PARAMETER OF *BEMISIA TABACI* (GENN.) UNDER
SEMI-FIELD CONDITION**

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The sweet potato whitefly, *Bemisia tabaci* (Genn.) (Hom: Aleyrodidae) is a major pest of field crops, vegetables and ornamentals in Iran. In this study, the effects of methanol extract of *Fumaria parviflora* was studied against immature stages of this pest on tomato cultivar Rio Grand – America. Experiments were conducted in a semi-field condition with an average temperature of 25 ± 5 ° C, 50- 60 percent relative humidity and light conditions of 16 hours light and 8 hours dark. Plant extract was sprayed on tomato plants in wooden cages covered with a mesh fabric which contains a population of different stages of sweet potato whitefly. The number of eggs, nymphs and pupae were counted at different days after application of plant extract. The results showed that the effect of extract on eggs, nymphs, all immature stages and total nymphal stage of *B. tabaci* is significant compared to the control and Maximum effect for all parameters was observed on the second day after applying of the extract. These findings indicate that the extract of *F. parviflora* is able to control this insect [1, 2]

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THE COMPARISON OF IRANIAN AND INDIAN EXTRACT OF
CYNARA SCOLYMUS L.

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Cynara Scolymus L. (Artichoke) is an herbaceous perennial plant in the family of composite that has been used in several countries for liver and gallbladder disorders. Extract of Artichoke stimulates bile production and aids to increase digestion and absorption of nutrients with lowering blood cholesterol levels [1, 2]. Besides, people who suffer from gastric discomfort and irritable bowel syndrome (IBS) can take this supplement to reduce pain, nausea and sensation of fullness. Regarding nutrient and medicinal effects, study the various components of this plant are crucial. For this purpose, the hydro-alcoholic extract of Iranian artichoke was prepared and compared with Indian sample. By using Ultra-Violet (UV) spectrophotometer and High Performance Liquid Chromatography (HPLC), polyphenol compounds, particularly caffeoylquinic acids and flavonoids were measured [3, 4]. Also, the other compounds such as cynarin, chlorogenic acid, luteolin 7-O-rutinoside, and luteolin 7-O-glucoside were detected. Altogether, results provide show that the amount of phenolic compounds in Iranian artichoke was higher than the other species.

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EVALUATION OF CALLUS PRODUCTION POTENTIAL IN LEAF EXPLANTS OF PERSIAN SHALLOT (*ALLIUM HIRTIFOLIUM*); AN ENDEMIC AND ENDANGERED PLANT SPECIES

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Persian Shallot (*Allium Hirtifolium*), an economically important vegetable, is a monocotyledonous species originated in Iran. This species is classified in the Liliaceae family. *Allium Hirtifolium* is a native, endemic and endangered (almost extinct) plant species [1]. Plant Tissue culture is a suitable alternative method for preserving and reproducing endangered species [2, 3]. The first step of tissue culture is the development of callus from the differentiated Persian Shallot tissue. Therefore; in this experiment, the effect of various concentrations of 2.4.D (0.1, 1, 10 μ M), NAA (0.1, 1, 10 μ M), and BAP (1, 10 μ M) hormones and their interaction in *Allium Hirtifolium* was studied. Our results showed that, in comparison to other hormones, 2.4.D, especially in high concentrations, generates a higher percentage of callus formation and fresh weight in Persian Shallot leave explants.

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**CYTOGENETIC STUDY OF FOUR *SATUREJA* (LAMIACEAE)
SPECIES AND POPULATIONS IN IRAN**

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Savory (*satureja*) is one of the genera of Lamiaceae family. It consists of 284 species in the world. Iran is one of the savory germplasm sources in the world where has over 16 species that among them 9 species are endemic. Medicinal properties and numerous species increase the importance of diversity analysis in this genus. To investigate the diversity of the genus in Iran, 4 species (*S. mutica*, *S. macrosiphonia*, *S. sahendica* and *S. spicigera*) consisting of 14 populations were examined. The cytogenetic study has been done using the meristematic root tip cells. The results of samples demonstrated that the number of chromosomes in *S. sahendica* species is $2n=28$, in *S. mutica* species is $2n=48$, in *S. macrosiphon* species is $2n=24$, and in *S. spicigera* species is $2n=28$. Detailed karyotype analysis allows us to group the different populations and to postulate relationships among them.

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**INTERACTIVE EFFECTS OF ARBUSCULAR MYCORRHIZAL,
SALICYLIC ACID AND DROUGHT STRESS ON FRUIT YIELD,
MORPHOLOGICAL CHARACTERISTICS, ROOT COLONIZATION,
PHYSIOLOGICAL TRAITS AND SECONDARY METABOLITES OF
AJOWAN. (*TRACHYSPERMUM AMMI* L.)**

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Ajowan (*Trachyspermum ammi* L.) is an annual herb belongs to Apiaceae family. This plant has many therapeutic effects. In the present investigation, the response of Ajowan plant to foliar application of salicylic acid (SA) at three levels of 0, 150, and 300 ppm, irrigation at four levels i.e. control (FC), 25, 50, and 75% FC, and arbuscular mycorrhizal fungus (AMF), *Glomus intraradices*, at two levels as inoculated and non inoculated, along with interaction effects of the treatments were investigated. The measured factors were fruit yield, morphological characteristics, root colonization, chlorophyll, prolin, fixed oil content and compositions, as well as essential oil content and compositions. According to the results, inoculation of ajowan root with AMF, foliar application of SA, and drought stress caused a significant increase in the oil content and changed its compositions. The results showed that interactive effects of AM, SA and drought stress could significantly ($p \leq 0.05$) affect all measured traits. Moreover, application of SA at concentration of 300 ppm and inoculation of ajowan root with AMF fungus can compensate the water deficit up to 50% of the field capacity [1- 3].

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EFFECT OF SALICYLIC ACID AND CYCOCEL (CHOLOMEQUAT CHLORID) APPLICATION ON YEILD AND MORPHOLOGICAL TRAITES OF MOLDAVIAN BALM (*DRACOCEPHALUM MOLDAVICA* L.)

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Moldavian balm is an annual medicinal plant that belongs to the Lamiaceae family. The essential oil of this plant has natural antibacterial and antimicrobial substances and having wide usage in industries like pharmaceutical, dietary and many others. In order to determine the effect of three concentration of salicylic acid (0, 0.5 and 1mM) and cycocel (0, 0.5 and 1g/liter) on Moldavian balm, a pot experiment carried out in 2012 at the research greenhouse of university of maragheh. Treatments were applied with spraying five times during the vegetation at 7-day intervals one week after emergence. The experiment arranged as factorial based on completely randomized design with three replications. According to the results salicylic acid and cycocel treatments did not have any significant effect on plant height and lateral branches but had on leaf number and dry shoot yield. The highest leaf number belonged to spray of salicylic acid (1mM) + cycocel (1g/liter) and salicylic acid (1mM) + cycocel (0.5 g/liter) with 40 and 38 leaves at plant respectively. Treatment of cycocel (1g/liter) had the highest dry shoot yield (7/1 g/pot) of Moldavian balm. Moreover there was not an interaction between salicylic acid and cycocel application for dry Shoot yield.

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**COMPARE THE WEIGHT EFFICIENCY OF THE ESSENTIAL OIL
STACHYS BYZANTHINA PLANTS IN BOTH REGIONS GROWING OF
THE MAZANDARAN PROVINCE**

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Growth and yield of plants in ecosystems, influenced by various factors such as: species, regional climate, environment, soil, altitude and geographical position [1]. This study examines the effect of habitat on weight efficiency of the essential oil *Stachys byzanthina* plant in both regions growing savad- kooch and kojoor noshahr located in Mazandaran was paid. Samples in each habitat of the branches of flowering plants in full bloom in late June 2011, with three replicates were collected at random. Samples dried in shade and its oil obtained by Clevenger apparatus (hydrodistillation) then, percentage of oil yield was calculated [2]. Data analysis was conducted in SPSS software. Analysis and independent t-test was used to compare the yields of the two regions. The results showed the weight efficiency of the essential oil the habitate Savad-kooch, Kojoor Noshahr respectively 0.26 and 0.64 is. Statistical analysis showed Between yields on two different sites Significant differences There was a negative.

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**EFFECT OF *URTICA DIOICA* HYDRO-ALCOHOLIC EXTRACT ON
SERUM TESTOSTERONE LEVEL OF STZ - DIABETIC MICE**

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Urtica dioica has been used extensively in Iranian traditional medicine in treatment of diabetes. Diabetes has been associated with reproductive impairment in both men and women. The aim of our study was to assess the effect of hydro-alcoholic leaf extracts of *Urtica dioica* on serum testosterone level in diabetic mouse model. This study was carried out on 40 Swiss-albino mice randomly divided in 4 groups, control group (n=10) and *Urtica dioica* group that received 100 mg/kg intra-peritoneally extract of *Urtica dioica*, (n=10), and Diabetic group that received streptozotocin (STZ) (n=20) which was subdivided to two groups of 10; STZ group and treatment group. Groups 3 and 4 received 50 mg/kg of STZ intra-peritoneally for 5 days to induct diabetes. 1 week after the last injection, random blood glucose levels from tail vein blood of mice were checked and the blood glucose over 250 was considered as diabetic mice, then for 4 weeks, Treatment group received 100 mg/kg extract daily; however, the control group just received an equal volume of serum physiologic daily (IP). In 28th day after starting the protocol, 1cc blood was collected from abdominal aorta and the serum testosterone level was measured. The mean serum total testosterone in groups did not show significant statistical difference.(p >0.05).[1, 2]

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ETHNOPHARMACOLOGICAL USES OF *A. MILLEFOLIUM* L.
(YARROW) GROWING WILD IN EAST NORTH OF IRAN
(CHAHARBAGH REGION)

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A. millefolium (Asteraceae) is locally known as "Marambu" in north of Iran, which has been used by the rural people in folk medicine. In this study ethnopharmacological datas had collected from local shepherds and local healers of the Charbagh region (2000m) North of Iran. The collection area has the characteristics of terrestrial and cold climate, by warm to hot, dry summer and very cold winters. Yarrow has been used in treditianal form for grazing, and in combination with other herbs, as an anti-pathogene, anti-inflammatory, antispasmodic, pain killer, disinfectants, also a powerful healer for the treatment of wounds, skin infections, gastrointestinal and ulcer. Additionally, for the treatment of abdominal pain, dysmenorrheal, stop internal and external bleeding, menstrual pain has been considered. Nevertheless, local farmers bestrew dried flowers on their lands to avoid pathogens, pest and insects. Considering its many uses in traditional medicine in this region, this study can be a found of future research of production of natural medicines with low risks and antioxidants capacity. As well, *A. millefoluim* can be used as a natural pestids for commercial and agricultural purposes.



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**THE STUDY OF QUANTITATIVE AND QUALITATIVE CHANGES OF
HEAT SHOCK PROTEINS AND PEROXIDASE ENZYME ACTIVITY,
THE EFFECT OF REPEATED HEAT STRESS ON
MICROPROPAGATED *ZATARIA MULTIFLORA BOISS* IN VITRO
CONDITION**

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The synthesis of Heat Shock Proteins (HSPs) and the antioxidant enzyme is the main mechanism for contrary with heat stress. So in this study, investigated the amount of total protein and the change of peroxidase activity in subcultured explant of *Z. multiflora* in *in vitro* condition. The explants of *Z. multiflora* 40 days after subculture were primary heat stressed first and the explants achieved from subculture after 1 week were second heat stressed at 35, 40 or 45°C for 1h individually. The amount of total protein was verified 48h after the last stress on all of samples. For determination of protein level, Bradford spectrophotometry was used and qualitative analysis was done by SDS-PAGE electrophoresis. And the quantitative peroxidase activity was measured by Shimadzu spectrophotometer apparatus and polyacrylamid gel electrophoresis was used for qualitative analysis. The results showed that the explants which untreated (control) in control and pretreated shoots at 35°C, the second heat stress at 40°C has reduced the level of total protein extremely. In contrast, the shoots which were pretreated at 40 or 45°C, have not shown this reduction. In comparison with untreated or treated samples at 35°C, one excess band was observed in pretreated shoots at 40°C and 3 excess bands was observed in pretreated samples at 45°C. And that activity of peroxidase in unpretreated samples was the most of others and on pretreated shoots at 45°C was the lowest. The mean peroxidase activity in second elevated treatment (40 or 45°C) was so lower than the first group (control or 35°C). The rate of peroxidase activity was lower in explants which treated with elevated treatment for just one stage or even two stages, so they formed identical bands that were weaker, while the sample that didn't elevated stress formed more coloured band. The results indicated that the reduction of total protein was achieved by extreme heat stress in this plant, but pretreatment of heat stress can prevent this result And indicated that peroxidase activity was reduced by high heat stress even if the high stress apply just one stage.

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**VARIABILITY OF PHOTOSYNTHETIC PIGMENTS IN ROSEMARY
(*ROSMARINUS OFFICINALIS*) UNDER ARBUSCULAR
MYCORRHIZAL FUNGI SYMBIOSIS AND HEAVY METALS STRESS**

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Rosemary (*Rosmarinus officinalis*, Lamiaceae), has been used as a medicinal, aromatic and ornamental plant since ancient time. Since importance of *Arbuscular mycorrhizal* fungi (AMF) in ecological agriculture, application of AMF in medicinal plants production systems takes into consideration. The beneficial effects of *Arbuscular mycorrhizal* fungi (AMF) symbiosis in plant species includes many functions such as improving plant growth and development, facilitating of water and nutrient absorption and also increasing plant tolerance against biotic and abiotic stresses. In order to evaluate the effect of AMF symbiosis under heavy metals stress on variability of photosynthetic pigments in *R. officinalis*, a greenhouse experiment was carried out as factorial based on randomized complete block design with four replications at Research Greenhouses of Horticultural Sciences, College of Agriculture and Natural Resources, University of Tehran, in 2012. Treatments containing AMF symbiosis (with and without plant inoculation) and two heavy metals Pb (0, 150 and 300 mg/kg soil) and Cd (0, 40 and 80 mg/kg soil). Criteria such as chlorophyll a, chlorophyll b, total chlorophyll and total carotenoid were measured. The Results revealed that non inoculated plants in combination with no heavy metals stress enhanced the amounts of both chlorophyll a and total chlorophyll. Also The highest amount of chlorophyll b obtained in non inoculated plants and no heavy metals stress which had not significant difference with AMF inoculated plants with 150 mg/kg Pb. Application of 80 mg/kg Cd without AMF inoculating caused the lowest amounts of chlorophyll a, chlorophyll b and total chlorophyll. Increasing Cd concentration to 80 mg/kg in inoculated plants with AMF reduced total carotenoid while using no heavy metals increased the carotenoid level in plants with AMF symbiosis. According to our results, it seems AMF symbiosis can help the plant via alleviation of heavy metals damage especially in severe heavy metals stress.



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**EVALUATION OF SOWING DATES AND PLANTING DEPTH ON
EMERGENCE CHARACTERISTICS AND PRODUCING TUBER OF
MEDICO- INDUSTRIAL PLANT OF *FERULA GUMMOSA***

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To assessing the effects of planting dates and depths on emergence and tuber production of endangered medico- industrial *Ferula gummosa*, an outdoor pot experiment conducted in Natural Resources and Environment Faculty of Ferdowsi University of Mashhad at 2011. The experiment had done as Factorial in completely randomized design with 10 replications. Treatments contained 5 levels of planting dates (26 January, 10 March, 25 March, 15April, 25 April) and 2 level of planting depths (2 and 4 cm). Results showed that sowing dates, depths, and their interactions have significant effect on the percentage and speed of seed germination of *Ferula gummosa*. The first sowing date (3 February) show the highest rate of emergence about 54% and no emergence observed at planting dates of April 3 and 13. Emergence rate was also higher a little but significant in 2cm than 4cm planting depth. The second planting date (26 January) with an average of 1.25 tubers per pots, shows the highest tuber production while no tuber production observed at two last sowing dates. Base of the results of this study, relatively deep planting of *ferula gummosa* in mid-winter, have more priority than spring sowing due to higher speed and percentage of germination and also tuber production.

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**SURVEY THE EFFECTIVE FACTORS OF EDUCATION, EXTENSION
AND RESEARCH ON THE DEVELOPMENT OF MEDICINAL PLANTS
INDUSTRY, "A CASE STUDY OF MARKAZI PROVINCE"**

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Because of the import and production of medical drugs and developing medicinal new science for about four decades ago have declined sharply in Iran. Also, the strong tendency of physicians to prescribe drugs and little or no information about their advantages and how to use medicinal plants, use the medicinal plants gradually declined in Iran. At the same time in some cases forgot them. However, in recent decades, global attention to these plants increased significantly. Nowadays medicinal plants go to the previous location in Iran. But the planning and development of this industry in Iran is not enough transparency. Major provinces such as Markazi Province are no exception. Several problems have hindered the development of this industry. The research targets are identifying the factors and strategies for developing medicinal plants industry in Markazi Province. The research method is Survey and Statistical community are leaders, extension workers, and experts of medicine plant are in Markazi province. Research measurement's validity was confirmed by apprising 5 managers and experts of medicinal plants. The study is validated using five views of management and medicinal plants were confirmed. Research measurement's reliability was confirmed by Cronbach's alpha test (0.78). The results showed that the effect of "informing and educating people about medicinal plants from television", "educate physicians on the benefits of medicinal plants", "usability of research results on medicinal plants" in the development of this industry, are more than the others. The results of the factor analysis confirm that the seven main factors that explain the variance of medicinal plants industry development and strategies. The four factors that are more important than others are: "education and extension of medicinal plants» (V = 16.54), «standard skill and Radio and television Information» (V = 13.83), «technical and professional education» (V = 11.48) and «research development» (V = 10.37) are the priorities. Newrthless, the Kruskal-Wallis ANOVA results show that the personal and professional views of respondents less differed significantly in their view of the issues and proposed solutions for developing the medicinal plant industry. The five variables included "education", "experience in agriculture," "current vision for the development of medicinal plants prescribed by physicians", "The current use of the province capacity of medicinal plants" and "evaluate the current situation of the landscape production of medicinal plants" has created more significant "in statistical sample's view of some of education, extension and research factors on medicinal plants industry.



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**STUDY THE EFFECT OF HARVEST TIME AND PLANT DENSITY
ON AGRONOMIC ATTRIBUTES OF THYME
(*THYMUS VULGARIS* L.) IN SECOND YEAR**

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Thymus (*Thymus vulgaris* L.) is a medical herb and spice with lanceolate leaves that is used in food, medicine, adorning and hygienic industries. This plant has phenol compounds and anti bacterial and anti fungal effects. In order to study the effect of harvest time and plant density on yield of Thyme, an experiment was conducted in research farm of Kerman Agricultural Research Center, in 1391. A RCBD with 4 replications was used to compare the effect of 3 harvest times (Khordad 23, Shahrivar 6, Mehr 28 (June 12, Aug. 27, Oct. 19)) and 4 plant densities (8, 11, 16, 33 plants/m²). Data were statistically analyzed by MSTATC software and means were compared by Duncan multi range test ($\alpha=5\%$). Measured attributes were: plant height, canopy coverage, wet yield, dry yield, and dry leaves yield. Results showed that harvest time and plant density had statistically significant effects on measured attributes. Mean comparison showed that the tallest plant (33.27 cm), most wet yield (3.98 kg/m²) and dry yield (1.05 kg/m²) were observed in first harvest time (Khordad 23 (June 12)) and plant density of 33 (plants/m²).



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**STUDY THE EFFECT OF HARVEST TIME AND PLANT DENSITY ON
TARRAGON (*ARTEMISIA DRACUNCULUS* L.) YIELD IN THIRD YEAR**

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Tarragon (*Artemisia dracunculus* L.) is a medical herb from the family Asteraceae that has been used to treat epilepsy in traditional medicine. Tarragon essence has anti fungal and anti tumor effect[1]. Tarragon extract is used for curing the diabetic hyperglycemia[2]. In order to study the effect of harvest time and plant density on amount of essence and yield of Tarragon, the experiment is held in research farm of Kerman Agricultural Research Center in 1391 (2112), using a RCBD with 4 replications on 3-years old Tarragon plants. In this experiment, 3 harvest times (14 Ordibehesht, 24 Amordad, 5 Mehr (May 3, Aug. 14, Sep.26)) and 4 plant densities (8, 11, 16, 33 plants per m²) were studied. Data were compared by MSTATC software, and means were compared by Duncan multi range Test ($\alpha=5\%$). Measured attributes were: plant height, canopy coverage, wet yield, dry yield, dry leaves yield and essence percent. Results showed that the highest essence percent (0.46%) was yielded from Amordad 24 (Aug. 14) and plant density of 11 (plant/m²). The Highest wet yield (1.84 kg/m²) and dry yield (0.41 kg/m²) were harvested from Ordibehesht 14 (May 3) and plant density of 16 (plant/m²).

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THE EFFECT OF SALICYLIC ACID HORMONE (SA) ON SOME ANATOMICAL AND MORPHOLOGICAL CHARACTERISTICS OF WATERCRESS (*NASTURTIUM OFFICINALE* R. BR.)

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Watercress (*Nasturtium officinale*) is an aquatic, herbal, and perennial plant. It is classified into Brassicaceae family, which has a wide range of uses in cancer treatment, fat and sugar blood control. This plant is a source of 2-phenethyl isothiocyanate that can be derived from catabolism of glucosinolate [1]. In order to investigating the effect of salicylic acid (SA) on some characteristics of watercress, in this study, an experiment carried out in a completely randomized design, that consisted 4 levels with 3 repetitions. The treatment SA was in 0, 75, 100 and 125 mg/l. Hormones were sprayed at 5 times at intervals of a week. Phenotypes were measured in morphological and photochemical groups, for instance; Shoot and root length, fresh and dry weight, the amount of chlorophyll a and b, carotenoids and the diameter largest cell of xylem. compare means has showed that that the highest concentration of SA increased the average root weight, stem length and the diameter largest cell of xylem, concentration of 100 milligrams SA per liter increase in shoot dry weight.



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**MODELING COLOR AND SHRINKAGE VARIATIONS OF
TEREBINTH IN A SEMICONTINUOUS DRYER**

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Drying is one of the oldest methods for preserving of food and medicinal materials [1]. Drying greatly affected the quality of the product and is one of the most important steps in postharvest of medicinal plants. Dehydration plays an important role in quantity and quality of their ingredients. Drying avoids spoilage of the material from microorganisms or chemical attack, also the material weight reduces and transportation and maintenance costs decrease. Terebinth is used for decreasing of lipids and strengthening of the liver and spleen [2]. Terebinth fruit has a short life due to high humidity at harvesting time, so it is necessary to increase durability with drying. Experiments were conducted with continuous flow dryer in temperature levels of 45, 60, 75 °C, belt speeds of 2.5, 6.5, 10.5 mm/s and the airflow velocities of 1 and 2 m/s. Shrinkage and colour parameters including L (Light and darkness), a (Green to red) and b (Blue to yellow) measured. Variation ranges of L, a and b were between 2.95 and 16.94, 4.53 and 14.53 and -2.92 and 2.9, respectively. Shrinkage of the samples obtained between 12.3% and 16.7%.

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**HYPOLIPIDEMIC EFFECT OF HYDRO-ALCOHOLIC EXTRACT OF
URTICA DIOICA IN STZ - DIABETIC MICE**

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Urtica dioica has been introduced with hypoglycemic activity in Iranian traditional medicine. Lipid profile changes can be seen in metabolic syndrome especially in diabetes mellitus. The aim of our study was to assess the effect of hydro-alcoholic leaf extract of *Urtica dioica* on serum lipid level in diabetic mouse model. This study was carried out on 40 Swiss-albino mice randomly divided in 4 groups, control group (n=10) and *Urtica dioica* group that received 100 mg/kg intra-peritoneally extract of *Urtica dioica*, (n=10), and Diabetic group that received streptozotocin (STZ) (n=20) which was subdivided to two groups of 10; STZ group and treatment group. Groups 3 and 4 received 50 mg/kg of STZ intra-peritoneally for 5 days to induct diabetes. 1 week after the last injection, random blood glucose levels from tail vein blood of mice were checked and the blood glucose over 250 was considered as diabetic mice, then for 4 weeks, Treatment group received 100 mg/kg extract daily; however, the control group just received an equal volume of serum physiologic daily (IP). In 28th day after starting the protocol, 1 cc blood was collected from abdominal aorta and the serum lipid level was measured. Our study showed significantly lower levels of cholesterol and Triglyceride in mice which were treated with leaf extract of *Urtica dioica* as compared with the control group of mice (p<0.05), but we did not find significant correlations between changes in LDL and HDL levels of groups. The results of this study suggest that leaf extract of *Urtica dioica* decreases cholesterol and Triglyceride in STZ induced diabetic mice [1, 2].

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**EFFECT OF APPLYING CHEMICAL FERTILIZERS AND MUNICIPAL
SOLID WASTE COMPOST ON AMOUNT OF FLAVONOID,
ANTHOCYANIN AND MORPHOLOGICAL PARAMETERS OF HERB
CONEFLOWER (*ECHINACEA PURPUREA* L.)**

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Organic matter considered as one of the most important elements of soil fertility due to the beneficial effects on physical, chemical, and biological soil fertility characteristics. Municipal solid waste compost (compost) could be substituted with chemical fertilizers as valuable and cheap organic fertilizer in sustainable agriculture and organic farming [1, 2]. In order to investigate the response of medicinal plant coneflower to application of chemical fertilizer and incorporation with municipal solid waste compost (MSWC), a pot experiment was conducted with completely randomized design in six treatments: 1) control (without applying chemical fertilizer and compost), 2) chemical fertilizer (150 kg N, 120 kg P₂O₅ and 250 kg K₂O per hectare from urea, triple super phosphate and potassium sulphate source, respectively) (CF), 3) 30 ton MSWC/ha, 4) 15 ton MSWC+1/4 CF/ha, 5) 15 ton MSWC+2/4 CF/ha, and 6) 15 ton MSWC+3/4 CF/ha with 3 replications in 2012. Results indicated that, growth and yield indicators such as the number of flowers per plant, fresh flower yield, dry flower yield, flavonoid and anthocyanin contents in full bloom were affected by use of chemical fertilizer and MSWC. The incorporation of 15 ton MSWC +1/4 CF/ha enhanced the flavonoid content, anthocyanin content, number of flowers, total fresh and dry matter of flower about 80%.

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ETHNOBOTANICAL STUDY OF PABAND NATIONAL PARK
(MAZANDARAN PROVINCE)

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National park of Paband with a surface area about 24688 hectares is located near the Neka and Behshahr cities in northern part of Iran at the 53° 44' 72" to 54° 08' 01" Eastern longitude and 36° 23' 64" to 36° 30' 43" Northern latitude with an altitude of 980-3800m. In this contribution some floristic and ethnobotanical aspects of the area are given according to the conventional methods used in taxonomical and ethnobotanical studies. All collected plants were identified using available floras [1, 2]. A total of 68 Families, 238 Genera and 357 species were identified from the area. The largest family is Asteraceae with 30 genera and 43 species and the largest genera are *Salvia* and *Astragalus* with 5 species. Major of Plants are Pastoral (about 72 %) and remained species are used as medicinal (22%), poisonous (5%) and industrial plants (1%) respectively. The life form of plant species was determined using the Raunkier's method. Phanerophytes comprised 10/8%, chamaephytes 3/3%, hemicryptophytes 30/1%, cryptophytes 16/8% and therophytes 31/6% of the flora of area. The results were compared with some valuable texts and papers about medicinal or ethnobotanical usages of Iranian plant species [3- 5]. The most important medicinal plants of the area are: *Juniperus excelsa* (Cupressaceae), *Berberis vulgaris* (Berberidaceae), *Cichorium intybus* (Asteraceae) and *Mentha pulegium*, *Thymus kotschyanus* and *Teucrium polium* (Lamiaceae). These plants are the most famous medicinal plants and the people are extremely familiar with their traditional usages to remedy of diseases.

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INVESTIGATION OF CARVACROL AND γ -TERPINENE CONTENTS
OF SUMMER SAVORY (*SATUREJA HORTENSIS* L.) ESSENTIAL OIL
IN SARI CLIMATIC CONDITION

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The genus *Satureja* L. (*Lamiaceae*) includes 12 species of annual and perennial herbaceous plant in Iran. *Satureja* species have economic and medicinal importance because of their high essential oil content. Essential oil is extensively used in the food, flavor, perfume, cosmetic and pharmaceutical industries. Summer savory (*Satureja hortensis* L.) is a well known medicinal and aromatic plant native to Southern Europe, Anatolia, Caucasus, Iraq and western Iran but nowadays cultivated worldwide. Because of high biological activity and ease of large scale cultivation as a cash crop, the volatile oil, oleoresin, tincture and extract of *S. hortensis* are extensively used as seasoning, antioxidant and antimicrobial agents in the food and pharmaceutical industries. In order to evaluate the effect of sowing date and plant density on the main constituents of the essential oil (carvacrol and γ terpinene) in Summer savory a field experiment was conducted in Sari Agricultural Sciences and Natural Resources University by using of split-plot design in the base of randomized complete blocks with three replications in 2010. Main factors were three sowing dates (11 April, 22 April and 3 May) and sub factors were three plant density (15*35, 25*35 and 35* 35 cm). The plants were investigated in full flowering stage. Aerial parts of the plant were subjected to Hydro-distillation for 3 h using a Clevenger-type apparatus to produce essential oil. Chemical compositions of the essential oils were analyzed by (GC-MS). The main constituents of the essential oils in this investigation were carvacrol and γ -terpinene. The results indicated that the main constituents of the essential oils of *Satureja hortensis* L. (carvacrol and γ -terpinene) were not affected by sowing date and plant density. But carvacrol and γ -terpinene contents obtained from *Satureja hortensis* L. essential oil were in the range of 47.53-51.46 and 33.88-34.83 respectively, at three sowing date in 2010. This study showed that Sari climatic condition for achieved the maximum contents of carvacrol and γ terpinene was suitable and with good management and choose of suitable ways, can increased essential oil content and main constituents of the essential oils of *Satureja hortensis* L.

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**THE INFLUENCE OF SALICYLIC ACID LEVELS ON
MORPHOLOGICAL TRAITS AND ESSENCE YIELD OF GERMAN
CHAMOMILE (*MATRICARIA CHAMOMILA L. CV BODEGOLD*) UNDER
NORMAL AND HEAT STRESS CONDITIONS**

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In order to study the effect of salicylic acid on morphological characters and essence yield of German chamomile (*Matricaria chamomila* L. cv Bodegold) under normal and heat stress conditions, an experiment was conducted in Persian Gulf Study and Research Center, Persian Gulf University of Bushehr in 2012. Field experiment was carried out as completely randomized block design with 3 replications in a very hot area in Field of Agricultural and Researches Center located in Borazjan (29°12'21"N, 51°15'22"E, altitude 65 m), Bushehr, Iran. Treatments of this experiment including one German chamomile cultivar (Bodegold) and five levels of salicylic acid (0 (control), 1, 10, 25 and 100 mg/L) were applied. The seeds were sowed in two normal and heat stress sites. Delay sowing date (heat stress) was set that more vegetative stage and full flowering period faced with high temperature. The experiments were carried out through a factorial experiment in a randomized complete block design with three replications. Morphological traits consist of plant height, capitulum diameter, flower wet weight, flower dry weight and essential oil yield were assessed. Analysis of variance showed that salicylic acid levels had significant effect on all growth parameters and caused increased the essence yield under normal and heat stress. At the end of 100 mg/L treatment is reported as the best treatment under both conditions.

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INTRODUCTION OF MEDICINAL PLANTS SPECIES WITH THE MOST TRADITIONAL USAGE IN KALMAND PROTECTED AREA

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Ethnobotanical study of plants is an important method to obtain the valuable medicinal knowledge of native people and it is used in different traditional localities of Iran [1, 2]. On the other hand Kalmand protected area is an important area due to high attention of inhabitants to medicinal plants. This study tries to understand the traditional usages and benefits of plants in the region. Kalmand protected area is located in the Yazd Province at central parts of Iran plateau. At the first step, the region was divided into different villages with the aid of maps. Then the plant species were gathered from different sites and so the fully dried specimens were mounted on herbarium sheets. Finally the gathered species were identified scientifically using Botanical floras of Iran [3, 4]. This study introduce 24 medicinal plant species (belonging to 13 families) which most commonly used by indigenous people of Kalmand area. The botanical name, family name, vernacular name, part used and the application of plant species have been provided in this research. The traditional knowledge was recorded using practitioners and village seniors of region. We found some medicinal plant species, which were traditionally used in area. Finally, the traditional benefits of them were described and then they were compared with data on the medicinal clinical effects of plants.

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**DETERMINATION ANTIOXIDANT CAPACITY AND RATE OF
PHENOL UNDER SALINITY IN *ARTEMISIA AUCHERI BOISS***

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Reactive oxygen species are highly reactive chemical compounds which destruct DNA, carbohydrates, lipids and biological membranes. Several chemical reactions in the human body release them in the human body leading to lethal diseases. However, antioxidants limit oxidative reactions and scavenge produced free radicals[1]. *Artemisia aucheri Boiss* the scientific name of the family Astraceae medicinal plant and is native to Iran, Research has shown that plant species can have a significant antioxidant capacity. Many plant species have proven medicinal value. *Artemisia* species in traditional medicine as an anti-bleeding medication is used to relieve digestive problems [2]. In this paper, phenolic content and antioxidant capacity of different levels of salinity on shoot (0, 50, 100, 150, 200, 250, and 300 mM) has been studied. In this study, experiments to test the factorial design totally have been randomized with three replications. Rate of phenolic compounds with slightly modified method by Singleton Folin - Ciocalteu and the absorbance at 760 nm was measured by spectrophotometer [3]. The content of total polyphenols shoot a milli gram gallic acid per gram dry weight of the calibration curve of gallic acid at a concentration of 100 mM NaCl equal to 4/92 (GAE) g⁻¹ DW of extract of methanol on the break DPPH (2,2-diphenyl-1-1-picrylhydrazil) at 517 nm was measured according to the method by Braca et al[4]. Anti-radical activity of IC₅₀ (micro gram per milli) at a concentration of 100 mM NaCl equivalent to 42/67 can be expressed. The results indicate very significant correlation between salinity and high production of phenol and antioxidant activity of this plant as a natural resource is for human health.

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**APPLICATION OF CHEMICAL FERTILIZERS, MANURE AND THEIR
INCORPORATION ON SOME OF THE MORPHOLOGICAL AND
BIOCHEMICAL ATTRIBUTES OF CONEFLOWER
(*ECHINACEA PURPUREA* L.)**

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Nutrition management is one of the important factors in the success of the cultivation and production of medicinal plants. Identification of environmentally compatible fertilizers and suitable for the plant could have favorable effects on plant qualitative and quantitative attributes [1, 2]. According to the importance of medicinal plants and especially Coneflower in the provision of health and the effect of nutrients on growth and yield of plant, a pot experiment was conducted with completely randomized design in six treatments: 1) control (without applying chemical fertilizer and compost), 2) chemical fertilizer (150 kg N, 120 kg P₂O₅ and 250 kg K₂O per hectare from urea, triple super phosphate and potassium sulphate source, respectively) (CF), 3) 30 ton cattle manure (CM) per hectare, 4) 15 ton CM+1/4 CF/ha, 5) 15 ton CM+2/4 CF/ha, and 6) 15 ton CM+3/4 CF/ha with 3 replications. Results indicated that, application of chemical fertilizers, cattle manure and their incorporation with chemical fertilizer significantly affected the number of flowers per plant, fresh flower yield, dry flower yield, flavonoid and anthocyanin contents of leaves in full bloom stage. Application of 30 ton CM/ha⁻¹ resulted in the highest value of the number of flowers per plant, fresh flower yield, dry flower yield and total flavonoid content. Meanwhile, the highest anthocyanin content recorded in the leaves treated with 15 ton CM + 3/4 CF/ha.

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FUMIGANT TOXICITY OF ESSENTIAL OILS FROM *ACHILLEA WILHELMSSI* AND *ZIZIPHORA CLINOPOIDES* ON *EPHESTIA KUEHNIELLA* ZELLER

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The flour moth, *Ephesta kuehniella* Zeller (Lepidoptera: Pyralidae) is a worldwide pest and is associated with dry plant product especially cereals. Due to disadvantages of using chemical pesticides, an attempt was conducted to find a natural method for the control of *E. kuehniella*. The fumigant toxicity of essential oils from *Achillea wilhelmssi* (Asteraceae) and *Ziziphora clinopoides* (Labiatae) were bioassayed on the flour moth larvae. Essential oils were extracted from drayed leaves using a modified Clevenger-type apparatus. Experiments were conducted in laboratory conditions at 28±1 °C and 65 ±10% RH and 16:8 (light: dark) on 25 days old larvae. The toxicity test of essential oil from *A. wilhelmssi* and *Z. clinopoides* were carried out in four replicates. The bioassay with different doses of (2.24, 4.47, 8.94, 17.89, 35.78, 71.56 and 143.13 µl/l air) *A. wilhelmssi* showed that the LC₅₀ value and its confidence intervals were 22.25 (9.72-37.39) µl/l air and the bioassay with different doses of (2.32, 4.63, 9.27, 18.55, and 37.10 µl/l air) *Z. clinopoides* showed that the LC₅₀ and its confidence intervals were as 11.21 (5.85-18.63) µl/l air. Comparing the relative potency with POLO-PC software [1] showed that the toxicity of *Z. clinopoides* essential oil was 2-fold higher than *A. wilhelmssi*. Plant essential oils may be an alternative source for pest control because they constitute a rich source of bioactive chemicals against insect and fungi [2]. Therefore, the essential oils from *Z. clinopoides* can be effective for the control of *E. kuehniella*.

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**STUDY THE EFFECT OF DROUGHT STRESS AND SPRAYING
SALICYLIC ACID ON SOME GROWTH PARAMETERS OF SWEET
BASIL CULTIVARS**

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Aim of the research is study the effect of Salicylic Acid (SA) on decreasing the effect of drought stress in Sweet Basil (SB). In order to study the effect of drought stress and times of spraying with SA on SB cultivars, this experiment is conducted using RCBD with split-split plots with 3 replications. 3 levels of drought stress (complete irrigation, stopping irrigation in reproductive phase, stopping irrigation in vegetative phase) in main plots, and 4 times of spraying with SA (1 time spraying in 4-leaves step; 2 times spraying in 4-leaves step and vegetative phase; 3 times spraying in 4-leaves step, vegetative and reproductive phases; and control) in sub plots were compared. Phenologic and morphologic traits of SB including plant wet and dry yield, plant height, number of leaves and juiciness were noted. Data were statistically analyzed by MSTATC software and means were compared by Duncan multi range test. Results showed significant ($\alpha=1\%$) effect of drought stress on plant wet and dry weight, plant height, juiciness, and number of branches. Effect of spraying with SA on all mentioned traits was significant, except for plant height. SB cultivars were significantly different in all mentioned traits. The highest wet and dry yield (428 and 111 (gr) respectively) were measured in green SB. Wet yield in green SB was 14% more than violet SB. Drought stress decreased, but SA spraying increased wet and dry weight, in comparison with control. Result of interaction of drought stress, spraying SA and SB cultivars showed that the highest plant wet weight 996 (gr) was measured in green SB, complete irrigation and two times spraying.



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RESPONSE OF BASIL (*OCIMUM BASILICUM* L.) TO DIFFERENT RATES OF NITROGEN FERTILIZER

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Recently, the usage of fresh and dry leaves of Basil (*Ocimum basilicum* L.) has been very common in food and spice industries. The essential oil of plant is mainly used in food industries, perfumery, dental and oral products and in traditional rituals and medicines. Use of nitrogen to control crop growth and productivity has been one of the key contributing factors for the incremental improvement, not only in agricultural but also in medicinal crop production. In order to investigation of Herbage yield, essential oil content and essential oil yield of *ocimum basilicum* L. grown under different levels of nitrogen in the field, a field experiment was conducted in Sari Agricultural Sciences and Natural Resources University with 5 levels of nitrogen fertilizer including 0, 30, 60, 90 and 120 Kg/ha during 2010. This experiment was carried out in randomized complete block design with three replications. The plants were investigated in full flowering stage. Aerial parts of the plant were subjected to Hydro-distillation for 3 h using a Clevenger-type apparatus to produce essential oil. The results showed that a significant difference ($p < 0.01$) among nitrogen fertilizer rates application on leaf dry yield, stem dry yield, inflorescence dry yield, shoot fresh yield and shoot dry yield. Mean comparison showed that the highest dry leaf yield (1043.14 Kg/ha), dry stem yield (1355.78 Kg/ha), and inflorescence dry yield (1511.67 Kg/ha) was obtained with the N rate of 90 kg/h. But the highest shoot fresh yield (18673 and 18092 Kg/ha) and and shoot dry yield (3910.6 and 3624 Kg/ha) were achieved under 90 and 120 kg N/ha. The effect of nitrogen doses application was found to be statistically significant at %5 level for essential oil content and essential oil yield. According to result of this research, the highest essential oil content (0.58 and 0.64) were obtained with the N rates of 30 and 60 Kg/ha. The highest essential oil yield (20.81 Kg/ha) were obtained from the 60 Kg/ha nitrogen application. The results of this study showed that nitrogen fertilizer application up to 90 and 120 kg/h for achieved the maximum herbage yield and nitrogen fertilizer application in lower rates (30 and 60 Kg/ha) and up to 60 Kg/ha for achieved the highest essential oil content and essential oil yield in Sari climatic condition was suitable.

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**EFFECT OF IRRIGATION WITH TREATED MUNICIPAL
WASTEWATER ON GEOWTH AND YIELD OF DIFFERENT
ALEO VEAR CULTIVARS**

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Plants are frequently exposed to a variety of external conditions able to affect their growth, development and productivity. A greenhouse experiment was conducted to investigate the effect of treated municipal wastewater (TMW) on the on growth and yield of different Aloe Vera cultivar. Experiment was conducted as factorial arrangement based on completely randomizes design with 3 replication in the research greenhouse of Islamic Azad University, Sabzevar on 2010. Treated municipal wastewater was supplied from Sabzevar sewage treatment plant in Sabzevar. Factors were cultivar types (Red flower and yellow flower) and irrigation types (freshwater irrigation on growth season, Alternative irrigation with freshwater and municipal wastewater, 2 municipal wastewater +1 freshwater irrigation and municipal wastewater on all growth season). There was no significant difference between two cultivar for leaf thickness, leaf gel weight, total plant biomass, leaf number, leaf length and leaf weight number. Red flower cultivar was superior to yellow cultivar. Freshwater irrigation had the highest total plant biomass, leaf number, and leaf length and leaf weight number than other treatment. Moreover alternative irrigation with freshwater and municipal wastewater irrigation had suitable growth and yield on two cultivar but irrigation with municipal wastewater was decreased all measured characteristics. Other study reported that higher growth was obtained for Aloe vera grown under shade irrigated weekly with fresh water and fertilized with *Acacia saligna* [2]. It was found that short intervals of irrigation of Aloe increased chlorophyll content but reduced amino acid content.



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**THE EFFECT OF SALINITY ON GROWTH AND YIELD OF
DIFFERENT *ALOE VERA* CULTIVARS**

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Plants are frequently exposed to a variety of external conditions able to affect their growth, development and productivity. Salt stress is a limiting factor of plant growth and yield. Growth and yield of Aloe vera were reduced with increasing salinity. In order to study the effect of salinity stress on Aloe plant an experiment was conducted as factorial arrangement based on completely randomize design with 3 replication in the research greenhouse of Islamic Azad University, Sabzevar on 2010. Factors were cultivar types (Red flower and yellow flower) and salinity levels (0, 3, 6 and 9 ds/m). There was a significant difference between two cultivar for leaf thickness, leaf gel weight, total plant biomass, leaf number, leaf length and leaf weight number. Red flower cultivar was superior to yellow cultivar. Increasing salinity was decrease leaf thickness, leaf gel weight, total plant biomass, leaf number, leaf length and leaf weight number. All measured characteristics were highest for control but there was not significant difference between control and 3 ds/m. It was reported that in Aloe vera, 0.1% salinity result in an increase in growth parameters while 0.4% salinity reduces growth parameters. Response to salt stress in both cultivars were similar in most characteristics. Two cultivar had the lowest leaf thickness, total plant biomass, leaf length and leaf weight number on 9 ds/m.

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**STUDY OF THE EFFECT OF BISDEMETHOXYCURCUMIN ON THE
AMYLOID FIBRILLOGENESIS OF LYSOZYME**

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The efforts to discover diverse agents and drugs from the plant extracts have been made on a global scale. These phytochemicals are less toxic dietary compounds. Curcuminoids are natural polyphenolic coloring compounds in the rhizomes of *Curcuma longa* commonly known as turmeric. The major curcuminoids are curcumin, demethoxycurcumin, and bisdemethoxycurcumin (1-5% content of the turmeric). Curcuminoids have significant therapeutic potentials as antioxidant, anticarcinogen, anti-mutagenic, and anti-inflammatory. Curcumin serves as an active free radical scavenger and protects the brain from the lipid peroxidation. The mixture of the major curcuminoids has potential in the treatment of the Alzheimer's disease [1]. Protein aggregation is an important and complicated process in biology which affects the folding or normal functioning of proteins. Amyloid fibrillation is one of the ordered types of protein aggregation. Numerous degenerative diseases such as Alzheimer's disease, Huntington's disease, Parkinson's disease, prion disease, familial amyloid polyneuropathy, senile systemic amyloidosis, and type II diabetes are associated with the formation of amyloid fibrils. In these diseases, amyloids fibrils accumulate in the brain, or in one or more other tissues [2]. Inhibition of the formation of fibrils and capture of these species are effective approaches to tackling amyloidosis. Considerable studies have been done to develop anti-aggregating or anti-amyloidogenic agents as powerful strategies to battle amyloidosis. Hen egg white lysozyme (HEWL) is an appropriate model system to investigate the *in vitro* fibrillation process. This enzyme can lyse the cell walls of bacteria. HEWL is structurally homologous to human lysozyme, which is responsible for systemic amyloidosis in the human body [3]. In the current study, we investigated the effect of bisdemethoxycurcumin as a pharmacologically active curcuminoid on the *in vitro* amyloid fibrillogenesis of HEWL. The employed techniques included thioflavin T (ThT) fluorescence assay, circular dichroism (CD) spectroscopy, and atomic force microscopy (AFM). The results of this study revealed that bisdemethoxycurcumin has inhibitory and disaggregating properties against the HEWL fibrillation.

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**INFLUENCE OF ARBUSCULAR MYCORRHIZAL FUNGI ON
OCCURRENCE TIME OF GENERATIVE GROWTH AND
CHLOROPHYL CONTENT OF POT MARIGOLD
(*CALENDULA OFFICINALIS*) UNDER HEAVY METALS STRESS**

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Pot marigold (*Calendula officinalis*, Asteraceae) is an important medicinal plant that have numerous applications in different industries. These days, heavy metals contamination causes a major problem for agricultural soils. On the other hand, arbuscular mycorrhizal fungi (AMF) as a biological input have the ability of improving plant tolerance against biotic and abiotic stresses such as heavy metals stress. In this regard, a factorial experiment based on a randomized complete block design with four replications was conducted at Research Greenhouses of Horticultural Sciences, College of Agriculture and Natural Resources, University of Tehran, in 2012. Two levels of AMF application (inoculation and not inoculation with AMF) and three levels of heavy metals Pb (0, 150 and 300 mg/kg soil) and Cd (0, 40 and 80 mg/kg soil) were used. The occurrence time of generative growth such as early blooming and early flowering (days after transplanting) and the amounts of chlorophyll a, chlorophyll b and total chlorophyll were evaluated. The Results indicated that plant generative growth performed faster with application of AMF and no heavy metals stress, whereas, 40 mg/kg Cd increased the occurrence time of both early blooming and flowering in non inoculated plants. Using 80 mg/kg Cd without plants inoculation with AMF, prevented generative growth occurrence in *C. officinalis*. The highest amount of chlorophyll a and total chlorophyll obtained in non inoculated plants with 300 mg/kg Pb and in inoculated plants without heavy metals, respectively. Also, chlorophyll b level increased in plants without AMF inoculation. Based on our results, it seems that application of AMF as a biological agent can accelerate the time of generative growth occurrence in *C. officinalis* which its economic yield depends mainly on its flowering period.



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**INFLUENCE ORGANIC MANURES AND NITROGEN FERTILIZER
ON GROWTH, YIELD AND ESSENTIAL OIL COMPOSITION OF
AGASTACHE (*AGASTACHE FOENICULUM*)**

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Medicinal plants are very important in modern civilization in order to obtain natural active substances, known as secondary metabolites. The production of natural substances by plants is affected by cultivation conditions such as kind of fertilizer, so the main objective of this study was to determine the effects of organic and inorganic fertilizers on agro-morphological, quantity and quality essential oil of Agastache in semi-arid conditions of Tehran-Iran. The experiment was conducted at randomized complete block design with three replications. Treatments were Control, Nitrogen fertilizer (50 Kg ha⁻¹), Vermicompost (30 t ha⁻¹), Cow manure (20 t ha⁻¹), Cow manure (25 t ha⁻¹) and Combination of vermicompost and cow manure (30 t ha⁻¹ + 20 t ha⁻¹). The results showed phenological (Flowering time and Full bloom time) and morphological characteristics (Plant height, Fresh weight and Dry weight) of Agastache significantly influenced by type of fertilizer. Both of organic and inorganic fertilizers have resulted in to better growth of plants. Nitrogen fertilizer resulted in the highest fresh weight (9248.30 g plant⁻¹) but the highest dry weight was obtained at 25 t ha⁻¹ cow manure (1385.20 g plant⁻¹) followed by vermicompost treatment. Also obtained data revealed the essential oil content, herbage and essential oil yield of Agastache influenced by fertilizer type. The highest oil content was reported at control and the maximum herbage yield (1.63 t DW ha⁻¹) and oil yield (26.71 kg ha⁻¹) were obtained at vermicompost and 25 t ha⁻¹ cow manure treatments, respectively. GC and GC-MS analyses showed nine constituents in essential oil of Agastache and methyl chavicol was the main constituent. Different type of fertilizer had no significant effect on main oil constituents of Agastache but the minor compounds were influenced by treatments. Conclusively, our results indicate that organic manures improved growth and yield of Agastache.

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**THE EFFECTS OF NITROXINE, BIO SULFUR FERTILIZERS AND
SUPER ABSORBENT POLYMER ON ESSENTIAL OIL QUANTITY
AND QUALITY OF VEGETABLE PARTS OF *OCIMUM CILIATUM*
HORNEM**

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In this study the effects of nitrogen bio fertilizer (inoculation with a mixture of *Azotobacter* and *Azospirillum*), bio sulfur (inoculation with sulfur solubilizing bacterium *Thiobacillus*), super absorbent polymer and their interaction on content and constituents of essential oil of *Ocimum ciliatum* was investigated. The experiment was carried out at randomized complete block design with four replications and eight treatments. The results indicated that bio fertilizers and super absorbent polymer did not affect the essential oil content of basil as compared to the control but oil composition using GC and GC-MS revealed the volatile oil composition was affected as a result of applying various treatments also concentration of component influenced by fertilization of basil plants with bio fertilizers and super absorbent polymer. The main components of *Ocimum ciliatum* were methyl chavicol and citral (neral + geranial) that the contents of them had an opposite trend with each other. Application of bio fertilizers gave the highest content of methyl chavicol (67.1%) while the maximum values of neral (16.2%) in bio sulfur and super absorbent mixture and geranial (22.2%) in bio sulfur compared to the other treatments reported and the lowest content of both constituents was obtained in bio fertilizers treatments. In this study, the dominant compound presented under all treatments was aromatic compound, its content did not have a constant trend but the highest content of this group (68.8%) obtained in mixture of bio fertilizers. Monoterpene and sesquiterpene compounds were decreased and increased as a result of using bio fertilizers and super absorbent treatments, respectively.

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**THE STUDY ON PHENOLOGICAL PROPERTIES, YIELD AND
ANTHOCYANIN CONTENT OF ROSELLE
(*HIBISCUS SABDARIFFA* L.) CULTIVATED IN MASHHAD CLIMATE**

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Roselle (*Hibiscus sabdariffa* L.) is an annual plant of the family Malvaceae, which grows in tropical and subtropical regions. In Iran, it is typically known as sour tea. Different parts of this plant are used in traditional medicine. However, the commercial part used are calyx (sepals) that are rich in anthocyanins. Due to the antioxidant properties and color it has many applications in the pharmaceutical and food industry. In order to evaluate cultivation possibilities, Roselle was planted on the farm of Ferdowsi University of Mashhad and phenology stages were studied during six months. Then sepals were harvested for the determination of anthocyanin and yield. Anthocyanin was determined by the pH differential method of Chew (2009). The results showed that it is possible to produce the subtropical plants in Mashhad climate and the plants grow very fast and 37 days after cultivation the flowers appeared and harvest started twenty days after flowering. Peak flowering was in mid of September. At the end of October (30 October) due to cold weather, all fruits were harvested. Fresh sepals yield was 108.88 gr per square meter, which was equivalent to 14.50 gr of dried sepals. (The ratio of fresh weight to dry weight: 7.5). The maximum plant height is about 2.4 meter. The content of anthocyanin aqueous and ethanol extract were 0.46 and 1.54 mg.l⁻¹, respectively.

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ANTI APOPTOTIC EFFECT OF AQUATIC EXTRACT OF *CANNABIS SATIVA* (Δ^9 TETRA HYDRO CANNABINOL) AND *PROSOPIS FARCTA* (QUERCRTIN) ON CELL BODY OF MOTONEURONS AFTER NERVE CRASH

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Cannabis sativa and *Prosopis farcta* are plants with special pharmacological aims. experimental evidence supporting this hepothese that *Cannabis sativa* and *Prosopis farcta* have anti apoptotic effects on neurons [1,2], So in this study we investigated anti apoptotic effect of aquatic extract of *Cannabis sativa* and *Prosopis farcta* on cell body of after nerve crash. This experimental research was carried out on 48 male Wistar rats. Animals were divided into 8 groups; control, compression, A: compression + treatment with 25 mg/kg aquatic extract of *Cannabis sativa*, B: compression + treatment with 50 mg/kg aquatic extract of *Cannabis sativa*, C: compression + treatment with 25 mg/kg aquatic extract of *Prosopis farcta*, D: compression + treatment with 50 mg/kg aquatic extract of *Prosopis farcta*. Sciatic nerve compression of right thigh was done for 60 seconds. The first extract injection was done intra peritoneally immediately after compression and the second intera peritoneal injection was done a weak later. 28 days after compression, the Lumbar spinal cord was sampled. The density of alpha motoneurons was measured using dissector method then data was analyzed with use ANOVA statistical test. Neuronal density had a meaningful decrease in compression group comparing control group ($p < 0.001$) Neuronal density in all treatment groups showed a salient increase comparing compression group ($p < 0.001$) and this increase in B and D groups was more than A and C groups but there is not meaningful difference between B & D. *Cannabis sativa* and *Prosopis farcta* aquatic extracts with specified doses have anti apoptotic effects and this result probably issued of anti apoptotic factors extant in aquatic extracts [1, 2].

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**EFFECT OF ALCOHOLIC EXTRACT OF NETTLE (*URTICA DIOICA*)
AND SHALLOT (*ALLIUM ASCALONICUM*) ON CONTROL OF THE
*PENICILLIUM DIGITATUM***

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One of the most important limiting factors of production, are plant diseases that in order to control these pathogens used of chemicals fungicides. The reason harmful effects the pathogens, create a new breed, resistant and problems that are created in human health and environmental, use of substances and preparations of natural origin and without harmful side effects such as plant extracts are useful for controlling. plant extracts are a group of materials that are effective in herbs and have supportive characteristic in most of them against mushrooms and bacteria are known and are used since primitive. It has been reported, green mold (*Penicillium digitatum*) is the most common devastating microorganisms in the citrus store, which huge damage create to the products every year. This study investigated antifungal effects of alcoholic extracts of Nettle and Shallot on *Penicillium digitatum* which is caused storage rot, pathogenic fungi reaction to different plant extracts, determine the appropriate concentration of plant extracts in the control of fungal activity and development of healthy, sustainable and organic agriculture. The effect of alcoholic extracts of Nettle and Shallot evaluated against *Penicillium digitatum* in 0, 25, 50, 100, 500 and 1000 µl/lit concentrations at 27°C with 4 replications. Sterile water and alcohol were added instead of extract in control. The minimum inhibitory concentration (MIC) and growth inhibition percent were assessed by using medium mixing and then fungicidal and fungistatic of extracts were determined on the PDA medium. These results showed that two extracts Nettle and Shallot had antifungal effects in different concentrations and maximum inhibitory of Nettle and Shallot was in 50 µl/lit concentrations. Also, two extracts had fungistatic activity. Based on this research, two extracts showed relatively good antifungal effects. Therefore appropriate concentrations of these extracts can be used for the rot treatment in store that caused by pathogenic fungi *Penicillium digitatum* [1-3].

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EFFECT OF PLANT GROWTH PROMOTING RHIZOBACTERIA ON MORPHOLOGICAL PARAMETERS IN CORIANDER (*CORIANDRUM SATIVUM*) UNDER SALT STRESS CONDITION

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Salinity has drawn extensive attention throughout the world because over 6% of the earth's land area (up to 800 million hectares) is affected by either salinity or the associated condition of sodicity [1]. Plant-growth-promoting rhizobacteria (PGPR) are associated with plant roots and augment plant productivity and immunity; however, recent work by several groups shows that PGPR also elicit so-called 'induced systemic tolerance' to salt and drought [2]. The aim of this study was to evaluate the Plant Growth Promoting (PGPR) application on Morphological parameters in coriander plant under salt stress condition. This experiment was conducted as factorial based completely randomized design with three replications. Treatments were salt stress at four levels (control, 40, 80, 120mM) and PGPR inoculation at three levels (control, application of AA and PBA). Such as AA (contain of *Azospirillum* and *Azotobacter*) and PBA (contain of *Azospirillum*, *Bacillus subtilis*, *Pseudomonas fluorescens*). 30 coriander seeds were sown in plastic pots containing 3.5 kg soils. Six weeks after sowing, the seedlings were treated by salt water. Coriander plants were harvested 10 days after salt stress treatment. Afterwards, characters such as plant height, leaf fresh weight, stem fresh weight, total fresh weight, leaf dry weight, stem dry weight and total dry weight were determined. The results exhibited that interaction effect of biofertilizers and salinity was significant on all morphological parameters (at probability level of 0.01). Also, the highest amount of fresh and dry weight of plant, leaf and stem belonged to bacterial PBA inoculation treatment at 40 mM level as plant and leaf dry weight increased 45 and 27 percent compared with non-inoculated treatment, respectively. The maximum of plant height was observed in bacterial AA inoculation at control level that increased 6 percent compared with non-inoculated treatment. Generally all mentioned morphological traits were markedly decreased by increasing of salinity levels.

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SEDATIVE-HYPNOTIC EFFECTS OF *MYRTUS COMMUNIS* L.

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Myrtus communis L. (Myrtaceae) commonly called Myrtle (English), an evergreen shrub and has been used for treatment of inflammatory and respiratory diseases in Iranian traditional medicine. In several studies the antibacterial, anti-inflammatory, antioxidant, and antinociceptive effects of the aqueous and ethanolic extracts of this plant have been reported and involvement of opioid system in the analgesic effects has been suggested. In this study the sedative-hypnotic effect of the aqueous extract of Myrtle was evaluated by using experimental setup in mice. Male NMRI mice in the range of 22-35 g of weight were used in this study. Pentobarbital induced loss of righting reflex was used for evaluation of hypnotic effects of the extract of this plant. Open field test was used for evaluation of locomotor activity. The aqueous extract of Myrtle in dose of 200 mg/kg i.p. significantly reduced locomotor activity in open field test ($p < 0.01$). The significant hypnotic effect of aqueous extract of Myrtle in pentobarbital induced loss of righting reflex test was also showed ($p < 0.05$). Flumazenil was not able to reverse the effect of the hypnotic and sedative effects of the extract. These findings reveal that the aqueous extract of *Myrtus communis* L. has sedative and hypnotic effect and has potential use for treatment of insomnia. The findings also indicate that the benzodiazepine receptors are not involved in the sedative and hypnotic effects of the extract. For determination of exact mechanism of action and the active components of the aqueous extract, further studies are necessary.



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INVESTGATION THE EFFECT OF *HYPERICUM PERFORATUM*
ON CECUM AND BIG INTESTINAL MORPHOMETRIC IN MALE
WISTAR RATS

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St. John's wort or Perforatum is a herb that contain Hypericin and Hyperforin as the main components of the extract that binds with GABA and sigma opioid receptors. Several pharmacological effects such as analgesic, sedative, soothing, antispasmodic, anticonvulsant, anti-depressant and anti-bacteria have been determined yet. According to a report, *Hypericum perforatum* has led to increased body weight in mice. This study examined the effect of two doses of *Hypericum perforatum* on cecum and big intestinal morphometric in male Wistar rats. This study was performed on male Wistar rats. Among the 54 rats tested with 6 repetitions, effect of *Hypericum perforatum* extract was assessed in 3 groups. 3 rats from each treatment were considered for cecum and big intestinal morphometric. Treatments were: control (receiving water), groups two and three that received *Hypericum perforatum* extract (250 and 500 mg /kg.bw, respectively). Rats were treated with *Hypericum perforatum* day by day for 2 weeks, through the Gavage method. At the end of the experiment, rats were anesthetized and killed, cecum and big intestine were removed. The weight and length of these organs were measured by using a digital scale and vernier caliper, respectively. Cecum weight in the control group was significantly more than the 250 mg / kg.bw *Hypericum perforatum* treatment ($p \leq 0.05$). Between the 250 and 500 mg / kg.bw treatments were not seen any significant difference ($p > 0.05$). Big intestine weight was not significantly different among the three groups. Cecum length in the control group was significantly higher than the other two groups. Also, level of 500 mg / kg.bw *Hypericum perforatum* has increased the cecum length more than the 250 mg/kg.bw extract level. The length of big intestine was taller in control group than the other 2 groups ($p \leq 0.05$).

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**SULFURIC ACID EFFECT ON BREAKING DORMANCY OF SEEDS OF
"ZIZIPHUS JUJUBE MILL"**

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Jujube with scientific name of "*Ziziphus jujube* Mill" belonging to the Rhamnaceae species has very nutritious fruit rich in vitamin C, Calcium, Iron, Riboflavin, Niacin, and Carbohydrates. Germination of seeds of jujube as many other species of *Ziziphus* is done hardly due to seed dormancy and physical dormancy. This plant is concerned not only for medicinal purposes but also to stabilize the soil, vegetation development and desertification. Therefore, using strategic methods for breaking the dormancy of seeds is considered very important. This study aimed to evaluate the effect of chemical treatments on break dormancy and stimulating seed germination [1]. In this research the effect of different treatments on immersion in concentrated sulfuric acid for 15, 20, 25 and 30 minutes and distilled water (control) in a randomized block design for 5 times and each time including 15 seeds at 20°C to 30°C were studied. Variance of the raw data analysis and comparing results showed that among applied treatments, acid treatment for 20 minutes had the highest effect on increasing percentage and speed of seed germination. Although, at first, treatment with concentrated acid increased percentage and speed of seed germination, but the more this value decreased, the more duration of treatment increased that this decrease can be attributed to the loss of the fetus and viability. Overall, the results showed that the different chemical treatments can break dormancy and increase jujube seed germination compared to control by reducing hard seed shell.

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**INTERCROPPING OF BASIL (*OCIMUM BASILICUM* L.) MEDICINAL
PLANT AND COWPEA (*VIGNA UNGUICULATA* L.) IN NORTHERN
IRAN CONDITIONS**

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The present field research was conducted to evaluate the crop productivity and weed suppression in an additive series of basil (*Ocimum basilicum* L.) and cowpea (*Vigna unguiculata* L.) monocropping and intercropping during 2010 and 2011 under northern Iran (Sari) conditions. Various planting ratio including P₁: cowpea monocropping, P₂: 100% cowpea+25% basil, P₃: 100% cowpea+50% basil, P₄: 100% cowpea+75% basil, P₅: basil monocropping with weeding and unweeding and three levels of nitrogen fertilizer (N₀=0, N₁=50, N₂=100 kg ha⁻¹) were the treatments. Results showed that mean dry matter and grain yield of basil and cowpea was higher in monocrops as compared to each plants in intercrops. Maximum yield of basil (430.37 kg ha⁻¹) and cowpea (685.16 kg ha⁻¹) recorded in either 100; 50 when 50 and 100 kg ha⁻¹ nitrogen fertilizer added in weeding plots. Calculated land equivalent ratios (LER) revealed that the highest (LER= 1.43) belonged to 100; 50 ratio and using of 50 kg ha⁻¹ nitrogen in weeding condition while the lowest amount (LER= 0.87) was recorded at 100; 75 ratio, without of nitrogen application and unweeding conditions. Higher LER in intercropping treatments indicated yield advantage over monocropping due to better land utilization [1]. The maximum aggressivity values for basil (1.66) and competitive ratio (3.42) also recorded under 100; 25 intercropping, without nitrogen application and unweeding treatment. Actual yield loss (AYL) ranged from 4.44 to 0.034 that maximum and minimum amount belonged to 100; 25 planting ratio, weeding and using of 100 kg ha⁻¹ and 100; 75 ratio, without nitrogen application, unweeding treatments, respectively. All AYL values are positive indicating that intercropping two plants had a remarkable advantage rather than monocropping. Generally, there was significant weed suppression in terms of both weed density and biomass for the intercropping system over basil monocrops. Furthermore, increasing nitrogen fertilizer application allowed both plants to grow faster in intercropping and ultimately reduced weeds density and biomass. Less weed biomass production and weed density under intercropping system is due to higher inter-specific competition combined with complementarity between intercrop species that improve the crop stand competitive ability towards weeds [2].

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**INVESTGATING THE EFFECT OF HYPERICUM PERFORATUM
PERFORMANCE ON THE LOCOMOTION AND ELEVATED PLUS
MAZE**

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Fear is a physiological immune response against the risk. For a Long time, fear and anxiety, were important in psychological issues and have used lots of drugs to treat it. According to numerous reports, the plant *Hypericum perforatum* has an antidepressant effect. In traditional medicine, this herbal plant was used for lots of disease such as neurological disorders - mental as hysteria, epilepsy, convulsive states, nervous imbalance, nervous headaches, facial nerve pain and sciatic nerves. The aim of this study was to evaluate the anxiolytic effect of *Hypericum perforatum* extract. This study was performed on male Wistar rats. Among the 54 rats, the anxiolytic effect of *Hypericum perforatum* extract was assessed in 3 treatments (control, 250 mg/kg.bw and 500 mg/kg.bw). *Hypericum perforatum* extract. 3 rats from each treatment were considered for evaluating the behavior test that was worked for twice with an interval of one week. Testing interval two hours after the injection began. Time period considered was 5 minutes. The two locomotion and Elevated Plus Maze were used to measure and asses the behavior. Results of this study indicated that the time spent in the open arms of the plus maze, have no significant difference among the three treatments ($P > 0.05$). But a numerical significant difference was between 250 mg/kg.bw *Hypericum perforatum* treatment with the two controls and 500 mg/kg.bw *Hypericum perforatum* treatment. Analysis of the behavior test showed no significant difference in all three groups ($P > 0.05$). Minor differences in numerical view, between 250 mg/kg.bw *Hypericum perforatum* with control and 500 mg/kg.bw *Hypericum perforatum* groups was observed.

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**EFFECT OF DIFFERENT TREATMENTS ON BREAKING DORMANCY
AND SEED GERMINATION OF "ZIZIPHUS JUJUBE"**

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Jujube with scientific name of "*Ziziphus jujube* Mill" is a multipurpose tree belongs to the Rhamnaceae species. Germination of seeds of jujube as many other species of *Ziziphus* is done hardly due to seed dormancy and physical dormancy. Given the importance of this plant in medicinal and economical aspects as well as desertification, using strategic practices to break the dormancy of the seeds is considered essential [1]. This study aimed to evaluate the impact of physical and chemical treatments on breaking dormancy and stimulating seed germination. In this study, the effect of treatment with distilled water (control), scarification by sand paper and immersion in boiling water for 5 and 10 minutes, a randomized block design for 5 times and each time including 15 seeds at 20°C to 30°C were studied. Variance analysis and results comparison showed that among applied treatments, scarification by sand paper had the highest impact on increasing the percentage (69.3%) and speed (1.207) of seed germination. However, none of the treatments had significant effects on seed germination time delay. Overall, the results of experiments showed that various physical and chemical treatments can break dormancy and increase percentage of jujube seed germination by reducing hard shell compared with the control treatment.

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**THE EFFECT OF DIFFERENT TREATMENTS FOR BREAKING
DORMANCY AND GERMINATION OF SOME POPULATION OF
ALLIUM HIRTIFOLIUM SEEDS IN DIFFERENT REGIONS**

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Seed characteristics and environmental factors affect on germination and seed dormancy. In order to survey of the effect of various treatments viz. mechanical abrasion with Grindstone, Stratification, gibberellic acid, sulphuric acid and combination of different treatments for breaking dormancy and seed germination of seven populations of *Allium hirtifolium* from various regions like Arak, ashtian, Morzarin, Alashtar, Scholl Abad, Sepiddasht, Borojerd an experiment was undertaken to form of factorial experiment in completely randomized design with three replications in 2011. Data analysis showed that the treatments of gibberellic acid along gibberellic acid with grindstone more increased the germination of Sepiddasht and Morzarin (57%) seed as compared with other treatments when applied on the other test seeds from different regions. With due attention unsexual propagation of the *Allium hirtifolium* in natural area require to collection via shallot, thus supply the optimum conditions due to seed germination is necessity for seed dormancy, stimulation and cultivation of this medicine plant.

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**STUDY OF INHIBITORY EFFECTS OF HYDROALCOHOLIC
EXTRACT OF *STACHYS LAVANDULIFOLIA* VAHL. AERIAL PARTS
ON XANTHINE OXIDASE AND XANTHINE DEHYDROGENASE
ACTIVITIES IN MICE**

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Hyperuricemia refers to increased serum levels of uric acid (>8mg/dl) [1]. Hyperuricemia is associated with gout, uric acid nephrolithiasis, nephropathy and metabolic syndrome [2]. Hyperuricemia can result from increased production of uric acid, its reduced excretion or a combination of both [3]. The hypoxanthine and xanthine that are derived from the metabolism of purine bases, by xanthine oxidase or xanthine dehydrogenase enzyme during several successive reactions are oxidized and converted to uric acid [4]. The aim of this study was to evaluate the effect of hydroalcoholic extract of *Stachys lavandulifolia* Vahl. on uric acid production by these two enzymes. Fifty male mice were equally divided into 10 groups. These groups included: normal (distilled water), hyperuricemic (potassium oxonate at 250 mg/kg), hyperuricemic+S. *lavandulifolia* (potassium oxonate at 250mg/kg and *S. lavandulifolia* at 200, 400, 800 mg/kg), hyperuricemic+allopurinol (potassium oxonate at 250 mg/kg and allopurinol at 2.5 mg/kg), *S. lavandulifolia* (at 200, 400, 800 mg/kg) and allopurinol (at 2.5 mg/kg). All groups received their treatment once a day for seven consecutive days. The livers and kidneys were homogenized and the supernatant fractions were used to detect xanthine oxidase and xanthine dehydrogenase activities. The activity of these enzymes was measured by colorimetric method [5, 6]. The results showed that in both liver and kidney tissue, xanthine dehydrogenase activity is higher than xanthine oxidase activity. Also, the activity of these two enzymes in the liver tissue is more than the kidney tissue. The plant extract had no remarkable inhibitory effect on the activity of xanthine dehydrogenase in both liver and kidney. Maximum percent inhibition was observed at a dose of 800 mg/kg. On the other hand, the plant extract significantly inhibited xanthine oxidase activity in both tissues ($p<0.05$). In this respect, there was no significant difference between extract and allopurinol ($p<0.05$). Also, compared with the normal group, extract and allopurinol significantly reduced the enzyme activity in both hyperuricemic and normouricemic groups ($p<0.05$). The results indicate that aerial parts of *S. lavandulifolia* could be used as a natural therapeutic agent in treatment of hyperuricemia.

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EFFECT OF PLANT GROWTH PROMOTING RHIZOBACTERIA ON CHLOROPHYLL AND CAROTENOID CONTENTS IN CORIANDER (*CORIANDRUM SATIVUM*) UNDER DROUGHT STRESS CONDITION

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Researches related plant response to water stress is becoming increasingly important, as most climate change scenarios suggest an increase in aridity in many areas of the globe [1]. Plant-growth-promoting rhizobacteria (PGPR) are associated with plant roots and augment plant productivity and immunity; however, recent work by several groups shows that PGPR also elicit so-called 'induced systemic tolerance' to salt and drought [2]. The aim of this experiment was evaluation of PGPR application on chlorophyll and carotenoid contents in coriander plant under drought stress condition. This experiment was conducted as factorial in a completely randomized design with three replications. Induced treatments were included drought stress at three levels (FC, %70FC, %40FC) and PGPR inoculation at three levels (Control and application of AA and PBA). Such as AA (contain of *Azospirillum* and *Azotobacter*) and PBA (contain of *Azospirillum*, *Bacillus subtilis*, *Pseudomonas fluorescens*). In the present study, 30 coriander seeds were sown in plastic pots containing 3.5 kg soils. Six weeks after sowing, the seedlings were treated by water stress (10 days without irrigation). Then the chlorophyll concentrations of a, b, a+b and carotenoid were determined from the first leaf of each plant. The results exhibited that interaction of drought and bacteria had significant effect (0.01 probability level) on chlorophyll a, chlorophyll b, a+b and carotenoid contents. According to the results, bacterial inoculation had the positive and significant effect on all studied levels of drought on Chlorophyll and carotenoid content. So that the bacterial AA inoculation at three levels of stress caused increasing of 8, 29 and 32 percent of chlorophyll a concentration compared with non inoculation treatment, respectively. The highest content of chlorophyll b and a+b also belonged to bacterial PBA inoculation at FC level that increased 56 and 18 percent compared with non-inoculation. The maximum content of carotenoid in FC level was observed in non-inoculation treatment and with bacterial PBA inoculation was in a statistical group. Generally all mentioned Chlorophyll and carotenoid content were markedly decreased by increasing of drought levels.

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**HISTOPATHOLOGICAL STUDY OF THE EFFECT OF ORAL
ADMINISTRATION OF GREEN TEA EXTRACT ON
SPERMATOGENESIS IN MICE**

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Like coffee, Tea is one of the most important and most palatable drinks consumed in the world. Green tea is made from young leaves of *Camellia sinensis* plants. Oxidized polyphenols of the tea called “Tanin” that are different from other plant tannins. It have been reported several studies about the benefits of green tea to prevent cell death in the liver, kidney, brain, and its effects on the fetus in recent year, but there are no report about its effects on testicular tissue. The purpose of this study is evaluation of the histopathological effect of administration of different concentrations of green tea extract on spermatogenesis in mice. Fifty four male adult mice were divided into three groups, including control and treatment with 500 and 750 mg green tea extract. The extract was given by gavage to mice. Five mice from each group were anesthetized with ketamine 14, 28 and 42 days after start of the study. Then blood samples collect from the heart and mice were sacrificed. Finally testes removed and were placed in formalin fixative solution for preparation of histopathological sections. The results of this study showed that green tea extract significantly increased spermatogenesis in mice.

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**RESPONSE OF THE GROWTH AND PRODUCTION PUMPKIN TO
THE APPLICATION OF PHOSPHORUS CHEMICAL FERTILIZER
AND PHOSPHATE SOLUBILIZING MICROORGANISMS**

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Pumpkin (*Cucurbita pepo* L.) is an important and valuable medicinal plant for its seeds. Phosphorus is a major nutrient which its deficiency limits plant growth. This investigation was aimed at studying sources integrated application of phosphorus supply on growth and production of Pumpkin. A factorial experiment was done based on randomized complete block design with three replications. Co-inoculation of phosphate solubilizing microorganisms (PSM) (mycorrhiza and bacteria) with and without seed inoculations, and P chemical fertilizer at 0, 25%, 50%, 75% and 100% of recommended fertilizer were treatments. Data showed that significant effects were obtained with PSM and P fertilizer on all traits. Maximum oil yield (41.80 g m⁻²) and linoleic acid (68.30 %) were obtained with applying PSM and consuming 50% of the recommended P fertilizer. Seed yield was significantly increased in response to inoculation of PSM in the presence of low levels of P fertilizer. However, maximum mycorrhizal colonization obtained in 25% recommended P fertilizer. A high level of P fertilizer has a negative effect on the activity of PSM. However, a low level of phosphorus with PSM has a simulative impact on root colonization and productivity of Pumpkin and favors the activities of PSM.



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**EFFECT OF BIO AND CHEMICAL FERTILIZERS OF
PHOSPHORUS ON SOME AGRONOMIC CHARACTERISTICS AND
YIELD OF *CUCURBITA PEPO* L.**

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This research was carried out to evaluate Effect of bio and chemical fertilizers of Phosphorus on some agronomic characteristics and yield of *Cucurbita Pepo* L. So, a factorial experiment based on randomized complete block design (RCBD) with three replications was done. Treatments were seed inoculation at two levels (inoculation and non-inoculation) and phosphorus chemical fertilizers at four levels (25, 50, 75 and 100% recommended fertilizer). In the flowering stage, results showed that, consuming of 75% P fertilizer produced maximum number of leaves per plant (21.86), leaf dry weight (27.75 g plant⁻¹) and plant dry weight (49.66 g plant⁻¹). However, at the stage of fruit production, maximum number of branches and leaf dry weight per plant were achieved at inoculation treatment. With increasing P fertilizer consumption number of fruit per plant increased. Consuming of P chemical fertilizer up to 50% recommended with using P biofertilizer increased pumpkin growth, and produced maximum seed yield. It seems that the effect of P biofertilizer increases with consuming of lower levels of P chemical fertilizer recommended.



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EVALUATION THE RESPONSE OF YIELD, YIELD COMPONENTS AND ESSENTIAL OIL OF FENNEL (*FOENICULUM VULGARE*) TO THE USING OF MYCORRHIZA AND DIFFERENT DOSES OF PHOSPHORUS FERTILIZER

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In order to evaluate the response of yield, yield components and essential oil of fennel to the using of mycorrhiza and different doses of phosphorus fertilizers, an experiment was conducted based on randomized complete block design with three replications. T₁: control (without mycorrhiza and without P fertilizer), T₂, T₃, T₄, T₅; 300, 600, 900 and 1200 mg P fertilizer pot⁻¹, respectively, T₆ (mycorrhiza), T₇, T₈, T₉ and T₁₀; T₂+T₆, T₃+T₆, T₄+T₆ and T₅+T₆, respectively, were the experimental treatments. There were significant differences between treatments in terms of plant height, number of branch plant⁻¹, number of umbel plant⁻¹, number of umbellet umbel⁻¹, number of seed umbel⁻¹, number of seed umbellet⁻¹, seed yield, biological yield, and percent and yield of essential oil. Result indicated that highest plant height (75 cm), number of umbel plant⁻¹ (35.6 umbel), biological yield (35 g plant⁻¹), essential oil yield (43.4 g plant⁻¹) and grain yield (16 g plant⁻¹) were obtained at T₇ treatment. In general, results indicated that using of biofertilizer had a positive impact on improvement of quantity and quality traits of fennel plant and instead using of chemical fertilizer could be efficient use of inputs.



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**OPTIMIZING P AVAILABILITY FOR MEDICINAL PUMPKIN
AND ITS EFFECTS ON YIELD USING *ARBUSCULAR MYCORRHIZAL*
FUNGI**

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Arbuscular mycorrhizal fungi (AMF) have the capability to improve plant yield by increasing plant nutrient supply. This research was carried out in order to P availability for medicinal pumpkin and its effects on yield using arbuscular mycorrhizal fungi. Experiment was done as a factorial based on randomized complete block design (RCBD) with three replications was used. Treatments were phosphorus chemical fertilizer at five levels (0, 25, 50, 75 and 100% of recommended fertilizer) in the presence of absence of AMF. The results showed that with increasing phosphorus fertilizers, fruits number per plant was increased. Moreover, with increasing P fertilizer consumption of 75 percent, fruit weight decreased. In addition, with increasing number of fruit per plant, fruit diameter is decreased and smaller fruits produced. It seems that AMF inoculation and 75% level of chemical fertilizer had the same effect on fruit weight. So, probably AMF is a good substitute for phosphorus fertilizers. Mycorrhiza symbiosis had a direct relationship with pumpkin yield. In the end, it seems that the low rate of P chemical fertilizers application, leads to improved interaction with AMF.



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**EVALUATION OF THE REDUCTION OF NITROGEN FERTILIZER
APPLICATION USING NITROXIN BIOFERTILIZER AT THE
PRODUCTION OF ANISE (*PIMPINELLA ANISUM .L*)
MEDICINAL PLANT**

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Anise is one of the most important medicinal and aromatic plants due to its essential oils especially in its seeds. Application of biofertilizers in a sustainable agriculture system improves sustainability of yield especially in medicinal plants production. Hence, a factorial experiment based on randomized complete block design (RCBD) with three replications at the Research Farm of Bu-Ali Sina University in Hamedan was done. Experimental treatments were seed inoculation with Nitroxin biofertilizer at two levels (seed inoculation and non inoculation) and nitrogen (N) chemical fertilizer at four levels (0, 50, 75 and 100% of recommended N). With increasing N consumption from 0 to 100% of the recommended, significantly increased plant height, number of branches per plant, number of umbellate per umbel, number of seed per umbel, 1000- seed weight, biological yield and seed yield. Also, in comparison with non inoculation treatment, inoculation treatment increased number of branches per plant, number umbellate per umbel and 1000- seed weight. Mean comparisons for interaction of N fertilizer \times biofertilizer indicated that the treatment of seed inoculation with consumption of 50% recommended N, produced the highest seed yield. On the other hand, this treatment in addition to produce satisfactory yield, considerably decreased nitrogen fertilizer consumption, which could be a step toward healthy production and sustainable agriculture.



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**SALICYLIC ACID IMPROVES GERMINATION CHARACTERISTICS IN
FENUGREEK UNDER SALINITY STRESS**

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Fenugreek is an annual dicot belonging to the subfamily Papilionaceae of the Leguminaceae family. Fenugreek is known to have several pharmacological effects such as hypoglycemia [1], hypocholesterolemia [2], gastroprotective [3], chemopreventive [4], antioxidant [5], anti-inflammatory and antipyretic [6]. Salicylic acid (SA) has an effective role in abiotic stress tolerance, and one of the most important reasons for using SA in stress condition is due to its protective effects on plants under stress conditions. A laboratory experiment was carried out to assess the effects of seed priming with SA (0, 5, 10, 15 and 20 μ M) on germination characteristics of fenugreek (*Trigonella foenum*) under salinity stress conditions using different concentrations of NaCl (0, 50, 100, 150 and 200 mM). Germination characteristics, seed stamina index, relative water content and electrolyte leakage were measured after imposing salinity stress for 7 days. Salinity stress caused a significant reduction in germination and seedling growth of Fenugreek. Seeds primed with various concentrations of salicylic acid proved to be effective in salinity tolerance at the germination stage of Fenugreek. In general, hormonal priming with 10 μ M salicylic acid was more effective than the other concentrations. Based on the results SA as a phytohormone play critical roles in plant responses to salinity and it can be concluded that hormonal priming with salicylic acid increase the ability of fenugreek to grow successfully under saline conditions. Finally, in future, this hormonal priming treatment may be used for improving plant growth and yield in saline areas.

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**THE PERFORMANCE OF SOME FENNEL (*FOENICULUM VULGAR*
MILL.) ACCESSIONS UNDER DROUGHT-STRESS CONDITIONS**

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In order to evaluate the effect of drought stress on grain yield and its components of fennel accessions, a field experiment was conducted at faculty of agriculture, University of Zanjan in the spring of 2012. The experiment was conducted as a split plot based on complete randomized block design with three replications. In this study water stress in two levels included control and drought stress at reproductive stage were assigned to the main plots and five Iranian accessions of fennel included Zanjan, Lorestan, Esfahan, Hamedan and Kashan were assigned to the sub plots. The results showed that the effect of drought stress on grain yield, number of umbrella per plant, 1000-seed weight, number of umbellet in umbrella, number of seed in umbellet, number of seed in umbrella was significant ($p \leq 0.05$). Majority of mentioned traits decreased significantly ($p \leq 0.05$) under drought stress conditions. The findings revealed highly significant differences among fennel accessions in majority of yield and yield components traits. Also there is significantly a difference among fennel accessions in responses to drought stress. So the highest grain yield (4126.27 kg/ha) were obtained by Zanjan accession under control conditions and the lowest grain yield (742.63 kg/ha) were obtained by Esfahan accession under drought stress conditions. It seems that the Zanjan accession is superior than other accessions in both control and drought stress conditions.



**CHANGE IN THE ANTIOXIDANT ACTIVITY OF FENUGREEK
PLANTS INDUCED BY SALICYLIC ACID AND SALINITY**

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Salt stress belongs to factors limiting the plant productivity. Similarly to other stresses, reactive oxygen species (ROS) are also produced during salinity [1]. The plants defend against ROS by induction activities of certain antioxidative enzymes which scavenge ROS. Salicylic acid (SA) is a natural and hormone-like signal molecule for the activation of plant defenses, and regulates a large variety of physiological processes in plants [2]. The objective of this work was to study the effects of SA (0, 5, 10, 15 and 20 μ M) and NaCl (0, 50, 100, 150 and 200 mM) treatments on the antioxidative enzymes in fenugreek (*Trigonella foenum*) leaves and to elucidate the roles of SA and the antioxidative enzymes in plants under saline conditions. The results of variance analysis showed that the effect of salinity stress on antioxidants activity was significant statistically ($p < 0.001$). Mean comparisons of salinity levels showed that activity of catalase (CAT), peroxidase (POX) and polyphenol oxidase (PPO) increased with increasing in salinity stress and the highest activity was recorded for 150 mM of NaCl. In this study, SA application caused to an increase in CAT, POX and PPO activity. The highest activity of antioxidative enzymes was obtained in concentration of 15 μ M SA in compared to control, while had not significant different between concentration of 5 and 10 μ M SA. Similarly, reported that exogenous SA can regulate the activities of intracellular antioxidant enzymes such as SOD, POX and increase plant tolerance to environmental stresses [3-4]. In summary, the results indicated that SA treatment, increased capacity of antioxidant system in fenugreek leaves under salt stress.

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MEDICINAL PLANT (*NEPETA BINALUDENSIS* JAMZAD) TISSUE CULTURE AND α -TERPINENE VARIATIONS OF ESSENTIAL OIL *IN VIVO* AND *IN VITRO*

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Nepeta binaludensis Jamzad is an important medicinal species of Lamiaceae family. It is an endemic species with limited habitat in the highlands of northeastern Binalude mountains, Iran. The plant main secondary metabolites combinations are Essential oils. α -Terpinene (C₁₀H₁₆) is a monoterpene and commonly considered a perfume and flavoring chemical and therefore used in the cosmetics and food industries, its use both in the pharmaceutical and electronics semi-conductor manufacturing industries have also proven to be valuable. This study In Zabol university Research biocenter of cellular and molecular science experiment were carried out to study the impact was conducted to investigate the effect of *in vitro* conditions on *N. binadulens* α -Terpinene content. The experiment was conducted as a factorial experiment based on a completely randomized design with four replications. Callus induction was performed using gradient levels of 2, 4-D (0, 0.5, 1, 1.5, 2, and 2.5 mg.l⁻¹) and BAP (0, 0.5, 1 and 1.5 mg.l⁻¹), with 4 reapiton the stimulation of leaf explants in the *in vitro* culture on Murashige and Skoog (MS) medium. GC/MS analysis was done to compare the α -Terpinene content among *in vitro* and *in vivo* conditions. The results suggest that α -Terpinene synthesis showed an increase in all growth regulator combinations and *in vivo* conditions compared to hormone-free medium. Maximum α -Terpinene content (1.54%) was obtained in 0.5 mg.l⁻¹ 2.4-D plus 1.5 mg.l⁻¹ BAP compared of hormone-free medium. The results show that *in vitro* techniques are feasible method for α -Terpinene synthesis.



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**LEAVES ESSENTIAL OIL COMPOSITION OF LEMON VERBENA
GROWN IN AGGREGATE MEDIA AND AEROPONIC SYSTEM**

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Lemon verbena (*Lippia citriodora*) a perennial aromatic and medicinal plant belonging to verbenaceae family is cultivated mainly due to lemon like aroma emitted from leaves. The leaves have a long history of folk treatment for some diseases and are used to prepare herbal tea, which is reputed to have antispasmodic, antipyretic, sedative and digestive properties[1]. Phenolic compounds and essential oil are the main natural products which have been investigated in this plant. In addition to cultivar, the composition of essential oil is known to be affected by environmental factors including growth conditions and agronomic techniques[2]. Different growing media provide different conditions around the plant root, thus can have various effects on the quality of essential oil. In this experiment, essential oils from the leaves of *lippia citriodora* plants grown in aggregate media (perlite, vermiculite and sand) and aeroponic system were extracted by hydrodistillation in flowering stage. The chemical composition of essential oil was identified by GC-MS and the constituents and their individual percentage values were determined. In both samples monoterpenes were dominating compounds followed by sesquiterpenes. Geranial, neral, limonene and alpha-curcumene were the main components of essential oils in both samples constituting 64.7% and 59.7% of total oil in aggregate media and aeroponic system respectively. Percentage value of geranial, the major component of essential oil was 31.4% and 26.6% in aggregate media and aeroponic system respectively and for neral it was 22.8 and 19.2% in these production systems respectively. Relative proportion of other constituents were also different in two systems. The results of this study, specially for aggregate media are comparable with the soil grown plants in open-air and can be suggested as an appropriate system for mass production of high quality lemon verbena.

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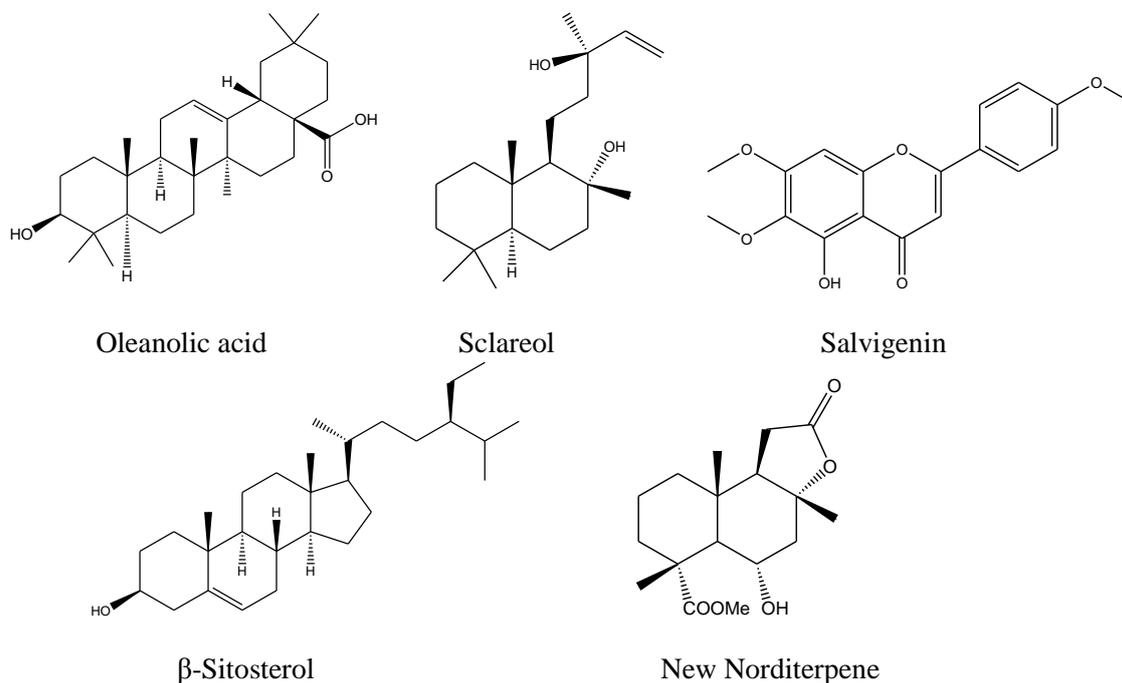
PHYTOCHEMICAL INVESTIGATION ON *SALVIA SAHENDICA* AND
STUDY OF THE CYTOTOXIC ACTIVITIES OF ITS ACTIVE
COMPONENTS

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Phytochemical investigation on *Salvia sahendica* as an endemic plant of Iran was carried out. Five compounds were isolated from its hexane extract and their structures were elucidated by 1D (¹H and ¹³C) and 2D-NMR. These compounds include oleanolic acid (an oleanane type triterpene), sclareol (a labdane type diterpene), salvigenin (a flavonoid), β -sitosterol (a sterol) and one new norditerpene. Cytotoxic activity of the fractions and the pure compounds were studied on breast cancer cell line (MDA-MB-231) by MTT assay.



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AN ANALYSIS OF GENETIC DIVERSITY OF *TRIPLEUROSPERMUM SEVANENSE*, *ANTHEMIS TINCTORIA*, *MATRICARIA RECUTITA* SPECIES USING PEROXIDASES MARKERS

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Chamomilla is a valuable herbal medicine that grows wild all across the north to the south of Iran. In this paper, the varieties of isoenzyme were considered. 11 of the studied populations were of *Anthemis*, 5 populations were of *Tripleurospermum*, and 3 populations were of *Matricaria*. Diversity of the population of chamomilla's enzyme was studied using three locus in an enzyme system which has peroxidase by electrophoresis discrete jell of Polyacrilamide. Between thirteen observed alleles, five rare alleles were seen in two locuses pxB and pxC. The frequency of alleles ranged from Sardasht population, which was related to locus pxB, and Uromie population, which was related to locus pxA. Correlation between genetic and geographical distance matrices was not significance ($R^2=0/027$, $p= 0/090$).

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**EFFECTA OF BIOLOGICAL MANURE ON SEED GERMINATION
CHARACTERISTICS AND ENZYME ACTIVITY IN *DRACOCEPHALUM
MOLDAVICA***

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Dragon's head (*Dracocephalum moldavica* L.) is an annual or perennial herbaceous plant from Lamiaceae family and *Dracocephalum* genus. The extract of this plant is used to cure some diseases such as cold, headache, nervous pains, etc. To investigate the influence of biological manure on germination of dragonhead seeds, an experiment was conducted in a complete randomized design (CRD) with three replications as a two-variate factorial. Experimental treatments included the genotype in two levels (G1: native biotype and G2: SZK-1 cultivar) and the bacterium (as the biologic manure) in five levels (B1: no inoculation, B2: inoculated with Azotobacter, B3: inoculated with Pseudomonas, B4: inoculated with Azospirillum, B5: inoculated with all three bacteria). The seeds were completely smeared in inoculation liquid before being planted in petri dishes. Germinated seeds were counted daily and the seedling, radical and plumule length and also dry weight of seedlings were measured. Enzymes (alpha amylase and beta amylase) activity was measured using DNS indicator in three stages (24 hours after germination, 48 hours after germination and 6 days after germination). Results showed inoculating the seeds caused to increase the germination percentage and rate as well as the plumule and radical length. The highest and lowest germination percentages were derived from seeds inoculated with Pseudomonas and Azotobacter, respectively. Usage of Azotobacter, Pseudomonas and azospirillum significantly increased the alpha amylase content compared to the control, but had a negative effect on beta amylase content. The results also demonstrated inoculating the seeds with bacteria caused more improvement in germination characteristics in native ecotype compared to the bred cultivar.

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**INVESTIGATING THE EFFECTS OF *LAVANDULA ANGUSTIFOLIA*
ESSENTIAL OILS ON FERMENTATION AND GAS PRODUCTION
PARAMETERS OF ALFALFA**

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In the recent years, social acceptance was decreased to use of antibiotics in animal feed (following European Union banned)[1]. Aim of this study was conducted to investigation the effects of different doses of *Lavandula angustifolia* essential oil on gas production and fermentation parameters of alfalfa using rumen fluid of cow. In this experiment alfalfa gas production parameter was measured by gas production technique [2]. Glass vials (100 ml) content buffered rumen fluid was used. Gas production was recorded at different times after incubation via pressure machine. At begin of experiment, different doses of *Lavandula angustifolia* essential oil (0, 800, 1600 and 2400 mg/l) added to the vials. There was analyzed by SAS software and, when means was significant Duncan method used for comparison. The Results showed that in comparison with control treatment adding of *Lavandula angustifolia* essential oil (0, 800, 1600 and 2400 mg/l) to alfalfa significantly reduced gas production potential (68.3, 39.7, 30.3 and 36.0 ml, respectively). Rate of gas production significantly decreased in comparison with control treatment (0.0346, 0.0145, 0.0173 and 0.0194 ml/h, respectively). Truly, degradation organic matter was significantly decreased after adding *Lavandula angustifolia* essential oil. This study indicated that *Lavandula angustifolia* essential oil duo to antimicrobial potential in high doses lead to inhibition microbial fermentation. There for, may be one could be concluded that *Lavandula angustifolia* essential oil reduce the methane and, had useful effect on environment.

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**EFFECT OF TWO EXTRACTION METHODS OF *RUBIA TINCTORUM*
ON MORTALITY OF COTTON WHITEFLY, *BEMISIA TABACI* (GENN.)**

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The sweet potato whitefly, *Bemisia tabaci* (Genn.) (Biotype A) (Hem: Aleyrodidae) is a major pest of field crops, vegetables and ornamental plants. Because of limitations and hazards that were produced in nature for use impolitic from toxins, in these days, plant toxins because of to be safe for environmental and easy application in different suitable methods with pests management control, to attract at helmet too much attention [1]. In this research, the effect of two extraction methods maceration and water bath of *Rubia tinctorum* on adults of *Bemisia tabaci* with leaf dip test were studied. Probit analysis of concentration-mortality data was conducted to estimate the LC₅₀ values for each treatment. Each laboratorial unit was consists of two clear plastic glasses (10 cm diameter, 15 cm height). Tomato young leaflets with 2 leaves (Ch variation) were treated by immersing in the tested insecticides for 5s. The treated leaflets were allowed to air dry and then *B. tabaci* adults were released on plants. . Numbers of dead *B. tabaci* adults were recorded for 48 hours post application. The experiments were carried out in a complete randomized design with three repetitions and each repetition consists of fifteen common *B. tabaci* adults. At 27 ± 2 °C, 60 ± 5 RH and photoperiodism of 16:8 h (L: D). The results showed the calculated LC₅₀ value for maceration and water bath were 35.118 and 47.520 mg/ml respectively and dosage-response gradient was estimated respectively 1.631 ± 0.296 and 1.624 ± 0.465 . At the based on calculated LC₅₀ and dosage-response gradient maceration plant extract on adults showed more toxicity than water bath. Therefore, these plant extracts can to use as safe and effective compounds in control of greenhouse pestes especially *B. tabaci*.

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**AN ANALYSIS OF GENETIC DIVERSITY OF *ANTHEMIS*,
MATRICARIA, *TRIPLEUROSPERMUM* SPECIES USING POPULATIONS
USING TOTAL PROTEINS AND ITS ASSOCIATION WITH
GEOGRAPHICAL FACTORS**

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Chamomilla is a valuable herbal medicine that grows wild all across the north to the south of Iran. This study evaluates the total proteins' profiles of 170 genotypes of cocksfoot from 17 populations available through Natural Resources Gene Bank (*Anthemis tinctoria*, *Matricaria recutita*, *Tripleurospermum sevanense*), in order to determine the extent of genetic diversity and the impact of geographical factors on this diversity. On the basis of SDS-PAGE, 34 reproducible bands were used for the analysis and genetic diversity was estimated based on the number of different protein peptides. The average of polymorphic bands over total detected bands ranged from 0.141 (in the population of Bane-2) to 0.361 (in the population of Sardasht). SDS-PAGE of total proteins showed high inter- and intra-population diversity and no clear differentiation on the basis of the origin or source. The mean genetic distance among populations was 0.0179 ranging from 0.0645 between Ghazvin and Bane-2. to 0.025 between Khoramabad and Ardebil-1. The correlation between genetic and geographical distance matrices was not significant ($R=0.030$, $p=0.180$), analyzed by means of Mantel test, indicating the lack of significant trends in variation of total proteins. These results suggested that the genetic base of cultivated chamomile should be broadened by involving diverse parents in the breeding program. Expansion of the genetic base for cocksfoot breeding might be achieved by systematic use of germplasm that differs in protein profiles and has better quantitative traits.

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**INVESTIGATING THE EFFECTS OF *LAVANDULA ANGUSTIFOLIA*
ESSENTIAL OILS ON FERMENTATION AND GAS PRODUCTION
PARAMETERS OF STRAW**

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In the recent years, social acceptance was decreased to use of antibiotics in animal feed (following European Union banned) [1]. Aim of this study was conducted to investigation the effects of different doses of *Lavandula angustifolia* essential oil on gas production and fermentation parameters of straw using rumen fluid of cow. In this experiment, straw gas production parameter was measured by gas production technique [2]. Glass vials (100 ml) content buffered rumen fluid was used. Gas production was recorded at different times after incubation via pressure machine. At begin of experiment, different doses of *Lavandula angustifolia* essential oil (0, 800, 1600 and 2400 mg/l) added to the vials. There was analyzed by SAS software and, when means was significant Duncan method used for comparison. The Results showed that in comparison with control treatment adding of *Lavandula angustifolia* essential oil (0, 800, 1600 and 2400 mg/l) to straw significantly reduced gas production potential (86.7, 13.0, 11.5 and 16.9 ml, respectively). Rate of gas production significantly decreased in comparison with control treatment (0.0125, 0.0303, 0.0254 and 0.0208 ml/h, respectively). Truly degradation organic matter was significantly decreased after adding *Lavandula angustifolia* essential oil. This study indicated that *Lavandula angustifolia* essential oil duo to antimicrobial potential in high doses lead to inhibition microbial fermentation. There for, may be one could be concluded that *Lavandula angustifolia* essential oil reduce the methane and, had useful effect on environment.

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THE NEW PERSPECTIVE OF MITIGATING EFFECT OF SILICON ON
BORAGO OFFICINALIS L. UNDER SALINITY CONDITION

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Plant growth and development are sustained by continuous cell division in the meristems, which is perturbed by various environmental stresses. Salt toxicity is a worldwide agricultural problem [1]. Numerous studies have demonstrated the benefits of silicon (Si) for higher plants. Si is known to effectively mitigate various forms of abiotic and biotic stress [2]. The work presented here studied the effects of salinity on developmental changes and mitigating effect of silicon occurring in the shoot apical meristem of borage. Borage seedlings were grown in hydroponics containing 120 mM NaCl with and without 1.5 mM Si. Structural changes occurring in meristematic cells of borage in response to salinity treatment were studied. Result show that Salinity caused disorders in meristems structure. When silicon was present in culture solution, silicon partially prevented this inhibition.

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ECOLOGICAL, PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITIES
OF *NASTURTIUM OFFICINALE* R. BR. IN ZIARAT MOUNTAIN
(GOLESTAN PROVINCE)

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In many Field observations the aerial parts of *Nasturtium officinale* R. Br., (Brassicaceae) with local name of "Outare" which grows around water habitat were collected in blooming from sandy loam soil (Ec.1.2 and pH. 5.6) with temperate weather from Ziarat Mountain (980m) as far 9km in South of Gorgan city Iran. Ethnopharmacological data showed that It has been used by the rural people of this village as nutritive and tonic vegetable, consumed raw in salads, as a tonic, immune system stimulant, antimicrobial agent and anti-inflammation to treat abdominal pain, diabetes, bronchitis, thyroide, influenza and asthma. Total phenolics (TP), and total flavonoids (TF) contents in aerial parts of the plant were investigated spectrophotometrically and their antioxidant activities were obtained by Total Antioxidant Capacity (TAC) method. TP content of aerial parts of *Nasturtium officinale* were 11.03 ± 1.06 mg GAEg⁻¹, TF contents were 36.1 ± 1.6 mg QuEg⁻¹. IC₅₀ contents in aerial parts of plant were 852 µg/ml in TAC method. Our findings showed a positive correlation between antioxidant activity and the most important secondary metabolites, which explains why this plant is used by the rural healers in north of Iran for nutrition and anti-inflammation.

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**EFFECT OF SALICYLIC ACID AND GIBBERLIC ACID ON
FLOWERING TIME, LEAVES AND RHIZOME NUMBER IN
TURMERIC (*CURCUMA LONGA*)**

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Turmeric is one of the medicinal plants of zingiberaceae family. It is a one of important perennial herb in the world. This plant has many medicinal properties, including anti-cancer, anti- microbial, hepatoprotective. Rhizome of this plant were obtained from Thailand and cultivated in Islamic Azad University Khorasgan (Isfahan) Branch for two years. Rhizomes of turmeric were soaked in gibberellic acid (0, 50, 100,150ppm) for 4h and soaked in salicylic acid with three concentration (0, 100, 200, 400ppm). The results showed Application of 150-ppm gibberellic acid significantly reduced the leaves number of rhizomes in this plant and blooming in treatment not observed. Best treatment for flowering of plants was the control and the use of with 200 ppm salicylic acid.

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**AN INVESTIGATION ON SOME MINERAL ELEMENTS AMOUNT IN
URTICA DIOICA PLANT IN GOLESTAN PROVIENCE**

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Urtica is belongs to Urticaceae family. The family is composed of 600 species distributed among 45 genuses. *Urtica* is an important genus that with 30 species and *Urtica dioica* L as a bipod nettle is categorized in this group that we studied it. Bipod nettle has medicinal properties and its extract have been used for hundreds of years in world traditional medicine. This study aimed to investigate mineral elements amount like k, Fe, Ca in root, stem and leaves of plants that were grown in different parts of Golestan province including Gorgan, kalaleh, sorkhankelateh. Atomic absorbtion analysis showed us that the highest level of K was observed in stem samples that were collected from Kalaleh (29.80 mg/g DW). The stem samples collected from sorkhankelateh showed the lowest K amount (15.18 mg/g DW). The stem samples collected from Gorgan region and Sorkhankelateh had 0.389 and 0.005933 mg/g Fe in dried material, respectively. The highest and lowest Ca was observed in leaf and root samples collected from sorkhankelateh (0.9887 and 0.20765 mg/g DW)



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INVESTIGATING THE EFFECTS OF DIFFERENT DOSES OF WILD SAGE SEED (*SALVIA MACROSIPHON*) ON FERMENTATION AND GAS PRODUCTION PARAMETERS DIET WITH HIGH CONCENTRATE

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According to Iran is a rich source of medicinal plants, so in order to take full operation of the bioactive properties secondary metabolites of these herbs, aim of this study was conducted to investigate the effects of different doses of Wild Sage Seed (*Salvia macrosiphon*) on gas production and fermentation parameters of diet with high concentrate using rumen fluid cow. In this experiment straw gas production parameter was measured by gas production technique [2]. Glass vials (100 ml) content buffered rumen fluid was used. Gas production was recorded at different times after incubation via pressure machine. At begin of experiment, different dose (0, 5, 10, 15 and 20 percent to diet) of Wild Sage Seed (*salvia macrosiphon*) added to the vials. There was analyzed by SAS software and, when means was significant Duncan method used for comparison. The Results showed that in comparison with control treatment adding of Wild Sage Seed (0, 5, 10 and 15 %) to diet significantly reduced gas production potential (92.8, 79.5, 78.2 and 81.1 ml, respectively). but treatment included %20 of Wild Sage Seed was not significant on gas production potential. Also rate of gas production between treatments was not significant. Whole levels of wild Sage Seed lead to decrease gas production after 24 h incubation. Decrease in gas production and estimated parameter could be due to antimicrobial properties of some secondary metabolites into Wild Sage Seed that inhibited activity of microorganisms from gas production. This reduction could be advantage to increase using of feed. Because in one hand showed reduction for organic matter fermentation, but on the other could show movement materials towards protein microbial production. However, due to the lack of direct measurement of microbial biomass in this experiment, Conclusion in this regard was difficult and further research is needed. Also antimicrobial potential Wild Sage Seed (*Salvia macrosiphon*) could be to further studies as suggested good supplements for ruminant diets.



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INVESTIGATION THE EFFECTS OF USING DIFFERENT LEVELS OF SATUREA (*SATUREIA HORTENSIS*) MEDICINAL PLANT AND SALINOMYSIN ON PERFORMANCE AND CARCASSES QUALITY IN BROILER CHICKENS STRICKEN WITH COCCIDIOSIS

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One of the most important diseases in broiler chicken flocks is coccidiosis which common throughout the world. *Satureja hortensis* L. (Savory) contains considerable amounts of two phenolic ketones (carvacrol and thymol) (3). With regards to having anti-inflammatory (5), antioxidant (4), antibacterial (4) and antifungal activities (1, 4), it has received major consideration. This study was conducted to examine the effects of different levels of *Satureja hortensis* L. (Savory) in comparison with an antibiotic growth promoter (salinomycin) on performance and carcass characteristics of broiler chicks. In this study 450 chicks, which stricken with coccidiosis at day 20, were weighted and randomly allocated to the five treatment groups, each with three replicates and with 15 broilers in each replicate. The dietary treatments consisted of the basal diet (control), 100, 200 and 300 mg/kg of savory and antibiotic group receiving salinomycin powder added to the basal diet. Performance parameters were measured in the different growth periods. At day 52 T two birds per replicate were slaughtered for the determination of carcass traits. The results showed that use of the different levels of savory hasn't significantly effects on weights of broilers in different periods at days 24, 31, 46 and 52. Feed conversion in treat with 100 mg/kg in 31 to 46 age (2.1) was better than the other groups and there was significantly different ($p < 0.5$) against control group (2.82). Although control group was better than other groups in 46 to 52 age. The carcass traits evaluated including abdominal fat, liver, pancreas and heart weights, except gizzard, were not markedly affected by dietary treatments. These results are consistent with those observed by other researches (6, 3). Thus; the use of savory with 100 mg/kg in 31 to 46 ages is recommended in breeding broiler.

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**ASSESSMENT OF TRADITIONAL MEDICINAL PLANTS
COMMERCIALIZED IN THE MARKETS OF MASHHAD, IRAN**

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An ethnobotanical survey on the medicinal plant species marketed in Mashhad city, Northeastern Iran was conducted with the aims of documenting traditional medicinal knowledge and application of medicinal plants. Traditional medicine is undoubtedly a reliable alternative approach to health care delivery in the metropolis because it is cheap, easily accessible, and efficacious. Ethnobotanical interview has been used as a basic method for data gathering. A questionnaire was administered only to people who had knowledge of medicinal plants, through face to face interviews. The data was arranged alphabetically by family name followed by botanical name, vernacular name, part used, folk use and recipe. The present investigation reported medicinal information for about 269 species, belonging to 87 vascular plant families and one fungus family. The most important family was Lamiaceae with 26 species, followed by Asteraceae with 23, Fabaceae with 20, and Apiaceae with nineteen. Through the analysis of records of plant based medicinal treatments, it becomes obvious that some of the plants are being used more frequently than the others such as *Achillea santolinoides*, *Astragalus gummifer*, *Bunium persicum*, *Cichorium intybus*, *Echium amoenum*, *Glycyrrhiza glabra*, *Malva sylvestris*, *Nardostachys jatamansi*, *Plantago ovata* and *Ziziphora clinopodioides*. Aerial parts (stem, leaves and flowers) is the most frequently used in medicinal purposes. Herbal medicine uses reported by herbalists can be classified into 132 different uses which show significant results to treat a wide spectrum of human ailments. The highest number of species and applications were reported for digestive system disorders, respiratory problems, urological troubles, nervous system disorders, skin problems and gynecological ailments respectively. The present paper provides baseline data for future pharmacological and phytochemical studies and preserve it to be used by the next generations [1, 2].

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**EFFECT OF SOME MEDICINAL PLANT EXTRACTS ON STABLE
POPULATION PARAMETERS OF
CHRYSOPERLA CARNEA (STEPHENS)**

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Demographic toxicology is a common method for investigation on the sublethal effects of insecticides on natural enemies. Side effects of thiamethoxam and three plant extracts; *Ferula gummosa*, *Rubia tinctorum* and *Aniethum graveolens* were evaluated on stable population growth parameters of *Chrysoperla carnea* (Stephens) in controlled condition in this study. Firstly, 100 1st instars larvae treated by spray tower method. Results showed significant differences ($p \leq 0.01$) between treatments for gross reproductive rate (GRR), net reproductive rates (R_0), intrinsic rate of increase (r), finite rate of increase (λ) and doubling time (DT) parameters. Also, the mean of r_m were max (0.102) in *A. graveolens* and min (0.061) in *F. gummosa*. Based upon our hypothesis, extract of *A. graveolens* is the best choice for some IPM programs because of its immunity on *C. carnea* as biological agents.

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**EFFECT OF FOLIAR APPLICATION OF HUMIC ACID AND POLLEN
TYPE ON QUANTITATIVE AND QUALITATIVE CRITERIA OF
MEDICINAL PUMPKIN (*CUCURBITA PEPO* VAR. *STYRIACA*)**

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Medicinal pumpkin (*Cucurbita pepo* var. *Styriaca*) a valuable medicinal plant belonging to the Cucurbitaceae family is used mainly for its seeds oil. The hull-less seeds of the *C. pepo* var. *Styriaca* are enriched in their oil content in which the predominant fatty acids of them are linoleic acid, oleic acid, palmitic acid and stearic acid. In order to investigate the effect of foliar application of humic acid and pollen type on quantitative and qualitative criteria of *C. pepo* var. *Styriaca*, a field experiment was conducted as factorial based on randomized complete block design with three replications at Research Station of Horticultural Sciences, College of Agriculture and Natural Resources, University of Tehran. In the year 2012. Pollen of three *Cucurbita* species (*Cucurbita pepo*, *Cucurbita moschata* and *Cucurbita pepo* var. *Styriaca*) with three levels of humic acid (0, 2 and 4 li/ 1000li) was used. Criteria such as seed length and width, number of seeds per fruit, 1000 seed weight, seed yield per unit area, fruit weight and seed oil percentage were evaluated. Results showed that seed length enhanced by application of pollen of *C. moschata*. There was no significant effect on seed width and seed yield per unit area under applied treatments. The highest amount of fruit weight observed by using *C. pepo* var. *Styriaca* pollen. Interaction effect of humic acid and pollen type had significant effect on seed number per fruit, 1000 seed weight and seed oil percentage. So that, 2 li/ 1000li humic acid and pollen of *C. pepo* caused the highest amounts of 1000 seed weight and seed oil percentage while the highest amount of number of seed per fruit observed in 2 li/ 1000li humic acid in combination with pollen of *C. moschata*. In general, based on our results, further studies is needed to clarify effects of pollen type from various *cucurbita* species on seed yield and quality of *C. pepo* var. *Styriaca* under low input cropping systems.



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**ANTIBACTERIAL EFFECTS OF SOME MARINE AND
TERRESTRIAL PLANT EXTRACTS ON *LISTERIA MONOCYTOGENES*
AND *BACILLUS CEREUS***

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Listeria monocytogenes is short bacillus, Gram-positive and selective aerobic bacteria. Food infections caused by this bacterium leading to complications such as meningitis, septicemia and cause abortion in pregnant women (1, 2). *Bacillus cereus* is gram-positive rod aerobic bacteria, which cause 25 percent of total food poisoning in the world those caused by two types of related poisoning toxins (3, 4). The algal samples from the coastal Busher province washed in distilled water and drained in dark condition. Extracts from these algae and clove, *Mentha langifolia* and oak fruit were acquired at room temperature using 70% ethanol. The bacteria were obtained from the Pasteur Institute. Half McFarland standard was used as bacteria standards (5). Antimicrobial susceptibility testing were determined methods of well method (6). The highest anti-bacterial activity was from internal layer of oak fruit extract against *Listeria monocytogenes* with inhibition zone diameter growth of 30.66 ± 1.5 mm and a maximum diameter against of *Bacillus cereus* in amount of 21 mm. These values for clove extract were 27.66 ± 2.51 and 15.66 ± 3.21 , respectively. *Mentha langifolia* had no effect against *Listeria monocytogenes* and its highest inhibition zone diameter against *Bacillus cereus* was 15.66 ± 3.21 . The highest inhibition zone diameter for *Padina Pavonica* extract against *Bacillus cereus* was 11 ± 2.12 mm. Mangrove leaf extract had no effect on the studied bacteria. Internal layer of oak fruit extract and clove extracts showed the highest respectively controlling effects on the growth of studied bacteria. Hydro-alcoholic extract of *Mentha langifolia* and algae *Padina Pavonica* had high inhibitory effect on *Bacillus cereus* but had no negative impact on *Listeria monocytogenes*.

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**EFFECTS OF SALINITY STRESS ON YIELD AND ESSENTIAL OIL OF
MENTHA (*MENTHA PIPERATA*)**

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The genus of *Mentha* (*Mentha piperata*) is one of the most important of medicinal plant which is used in pharmaceutical and food industries. Cultivated *Mentha* were in 6 levels of salinity (control 0, 2, 4, 6, 8 and 10 MMho/cm) with 3 replication was study to investigate of the effect of salinity on the amount of essential oil and yield by performing Randomized Complete Block design (RCB). The essential oil was obtained from leaves by steam distillation method. The results showed the different levels of salt were significant ($p < 0.001$). The highest amounts of yield were in control and the salinity of 2 MMho/cm (29.10gr and 34.82gr respectively) and the lowest one was 8 MMho/cm with 1.5gr. The amount of essential oil, the highest amount was in the salinity 10 MMho/cm (1.4ml) and the lowest was in control and the salinity 2 MMho/cm with 0.13ml. According to tests conducted, we conclude that the negative effect of salinity on yield and positive effect of that on the amount of essential oil.



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EVALUATION OF LIPOPROTEIN LEVELS AND
HEPATOTOXICITY OF *TEUCRIUM POLIUM* IN MALE RATS

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There are reports indicating that some doses of *Teucrium polium* has toxic effect on internal organs such as liver, an important organ in transferring and clearing chemical toxic agents [1]. *T. polium* is one of the medicinal plants that are usually used in traditional medicine in large quantities, without considering its side effects [1, 2]. The aim of this survey was to study the toxic effects of *T. polium* on serum levels of enzymes, lipoproteins and blood sugar in male rats. A total of 24 Wistar rats (weights: 180-200 g) were randomly divided to three equal groups. The first test group was received *T. polium* extract (200 mg.kg⁻¹) and second test group was received *T. polium* extract (300 mg.kg⁻¹) through intra-peritoneal (IP) injection and the third group was considered as control. Liver enzymes (ALP & GGT), serum lipoproteins and blood sugar were measured after two weeks. The result showed that ALP and GGT activities of test groups were significantly higher than that of the control group but other factors did not significantly difference. This study revealed *T. polium* consumption in male rat led to increasing the activities of liver enzymes, which is a sign of liver toxicity.

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**EFFECT OF SEED'S COAT OF MADDER (*RUBIA TINCTORUM*) ON
INDICES GERMINATION**

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This study was conducted to effect of seed coat on the seed germination characteristics of the annual and biennial Madder seeds (*Rubia tinctorum*). The experimental design was Completely Randomized Design (CRD) with three replications in the lab. Seeds coat consist of two layers that in the case were ripe on the plant so the over layer is soft and the lower layer is hard. Treatments included of 6 cases. Characteristics were the percentage and speed of germination seeds, Root and shoot length seeds, root and shoot fresh weight and vigor of seeds. The results showed that seeds without coat were the best treatment, in all characters of germination, in comparison another treatment. Analysis of variance showed effects of treatments on the seeds were significant ($P \leq 0.01$). Percentage of seed germination for uncoated seeds with 94% and for soft layer seeds with 91% were at the highest levels. Seeds without the coating, in the speed germination were at the highest levels at the value 9.32. biennial seeds, were the lowest levels at the mentioned characteristics.



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**EFFECT OF SILICON TREATMENT ON SOME MORPHOLOGICAL
AND PHYSIOLOGICAL TRAITS OF SALT-STRESSED CALENDULA
(CALENDULA OFFICINALIS L.)**

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A pot experiment was carried out to determine the effect of foliage spraying of silicon (Si) on growth and ornamental characteristics of calendula grown under salt stress and greenhouse conditions. A factorial experiment based on completely randomized design was conducted with 3 levels of Si (0 (control), 50, 100 mg/L) and 3 levels of NaCl (0, 100 and 200 mM) with 4 replications. At flowering stage, Si was applied with spraying two times in two week intervals. NaCl was also applied as drench (200 ml per pot) in two day intervals. The results showed that salinity decreased the growth, SPAD values, flower number per plant and flower diameter. However, foliar applications of Si resulted in greater root, shoot and total dry weight, plant height and leaf area of calendula plants under salt stress. The highest SPAD values were obtained from 100 mg/L Si application in all NaCl treatments. Salinity decreased number of flower per plant and flower diameter as ornamental characteristics; however Si increased them under salinity stress. Plants treated with 100 mg/L Si had the highest flower diameter at 100 mM of NaCl. Electrolyte leakage increased by salinity, however foliar application of Si significantly reduced electrolyte leakage under salt stress. These results suggest that the negative effects of salinity on the growth and physiological characteristics of calendula plants can ameliorate by foliar application of Si treatments.

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**COMBINATION EFFECT OF METHANOLIC EXTRACT OF
FUMARIA.PARVIFLORA, *TEUCRIUM POLIUM*, PYMETROZINE AND
CAL J N₃ TOMATO VARIETY ON BIOLOGICAL PARAMETERS OF
BEMISIATABACI (GENN.)**

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Cotton white fly *Bemisiatabaci* (Hemiptera: Aleyrodidae) is one of the most important pests of tomato that by sucking plant sap reduces its quality and quantity. This insect exists as an economic pest in most places of the world [1]. In this study, the effect sublethal dose of plant extracts of *f. parviflora*, *T. polium* and pestisidepymetrozin on *Bemisiatabaci* (Genn.) Developmental period of prematurity stages was evaluated on tomato variety cal j n₃. Insecticide Pymetrozine and water plus methanol were used respectively as positive and negative controls. The lethal dose 25 percent was used against adult insects. Tomato transplants with 2-4 leaves of variety cal-j-n₃ were immersed in the *plants* methanol extract, Pymetrozine and water plus methanol and then were placed in the glass cages. Thirty adults insects of the same age were released into the cages and after 72 hours the adult insects were removed and the eggs that their ages were less than 24 hours were kept and then the leaves containing eggs were examined every day by a binocular and eggs hatching time were recorded. Thus, duration of egg growth was determined. After eggs hatching and establishment of first instars nymphs on leaf a map of location of establishment of first instar nymphs on leaf was prepared and based on this map duration of nymphal period was determined and beginning of pupation stage regarding red eyes appearance. The time between red eyes appearance and exit of adults as pupation length was determined and calculated. And thus, the length of growth from egg to maturity was measured. The experiment was investigated in five replications in form of a completely randomized design, in the temperature conditions of 27±2°C and relative humidity of 50±5 percent and light conditions including 16 hours of light and 8 hours of darkness. In this test, no significant difference was observed between treatments in terms of egg incubation period as well as duration of pupation period. Considering nymphal period, a significant difference was observed in level of one percent. Developmental period in the control, *F. parviflora* extract, extract of *T. polium* and insecticide pymetrozin were recorded 14.55, 14.71, 14.54 and 15.23, respectively. There is a significant difference between treatments in terms of total prematurity stages. During the entire period of maturation in the control, *F. parviflora* extract, extract of *T. polium* and insecticide pymetrozin treatments 26.94, 26.84, 26.89 and 27.84 were observed respectively. So *F. parviflora* as a pesticide plant in pest management can be considered.



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NANOEMULSIFICATION OF *SATUREJA KHUZISTANICA*
ESSENTIAL OIL

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In this study, antibacterial activity of the essential oil from *Satureja khuzistanica* (Sk), is investigated. The essential oil was first analyzed using GC/MS and GC. Carvacrol was the major components of this EO. Since essential oils suffer from low solubility in aqueous phase for successful application, drug delivery systems such as emulsions have been used widely for delivery of Eos and other lipophilic drugs [1]. In this study, emulsions of essential oil of SK EO were prepared using polymeric surfactants. Emulsion droplet size and stability of the emulsions were then investigated using DLS technique. Also, antibacterial activity of essential oil and emulsions were determined using the dilution technique. MICs and MBCs were determined for essential oil and emulsions against the two gram negative bacteria *Moraxella catarrhalis*, *Pseudomonas aeruginosa* and a gram positive bacteria *Streptococcus pneumoniae*. MICs and MBCs of pure SK EO varied from 0.25 to 32 mg/ml, whereas these values were significantly reduced to 0.25 to 1 mg/ml for nanoemulsion preparations. Therefore, the nanoemulsion formulation was about 32 times more effective compared to pure EO.

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INVESTIGATION OF THE ANTIBACTERIAL ACTIVITY OF
SATUREJA KHUZISTANICA ESSENTIAL OIL IN THE VAPOR PHASE

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In this investigation, the antibacterial activity was determined for essential oil and emulsions of *Satureja khuzestanica* against two gram negative bacteria *Moraxellcatarrhalisa*, *Pseudomonas aeruginosa* and a gram positive bacteria *Streptococcus pneumonia* using a well diffusion method in the vapor phase. Results showed that *Moraxella catarrhalis* and *Pseudomonas aeruginosa* grew in all plates containing different volumes of EO and nanoemulsion. Whereas, the MIC of 34.38 $\mu\text{L/L}$ was obtained for *Streptococcus pneumonia* for EO and emulsion in the vapor phase. Since nanoemulsion contained 10 percent of EO, the effect on *Streptococcus pneumonia* was much more eminent for nanoemulsion compared to EO. Analysis of Carvacrol using GC in the head space indicated that the nanoemulsion could act as a reservoir introducing EO slowly into the environment and leading to a lower MIC compared to EO. The results indicate a major improvement in the antibacterial activity of SkEO in nanoemulsion formulation [1-3].

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COMBINATION EFFECT OF METHANOLIC EXTRACT OF *FUMARIA PARVIFLORA*, PYMETROZINE AND CAL-J-N₃ TOMATO VARIETY ON PREMATURITY STAGE MORTALITY OF *BEMISIATABACI* (GENN.)

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Cotton white fly *Bemisiatabaci* (Hemiptera: Aleyrodidae) is one of the most important pests of tomato that by sucking plant sap reduces its quality and quantity [1]. This insect exists as an economic pest in most places of the world [2]. Transmission of various viral diseases is another reason for damage creation of this pest [2]. In this research, the effect of sub lethal dose (LC₂₅) of plant extract (*F. parviflora*) was evaluated on the percentage of casualties of eggs, nymphs, pupae and total prematurity on tomato. Tomato transplants with 2-4 leaves of variety cal j n₃ were immersed in the *F. parviflora* methanol extract, and water plus methanol (control) and then were placed in the glass cages. Thirty adults insects of the same age were released into the cages and after 72 hours the adult insects were removed and the eggs that their ages were less than 24 hours were kept. The percentage of casualties of eggs, nymphs and pupae was determined based on counting the number of eggs, first instar nymphs and pupae and adults insects getting out of pupae and subtracting the aforementioned numbers from each other. The experiment was investigated in five replications in form of a completely randomized design, in the temperature conditions of 27±2°C and relative humidity of 50±5 percent and light conditions including 16 hours of light and 8 hours of darkness. Data analysis was performed by SPSS 19.0 software. Mean values obtained were compared by Duncan multiple range test. In this test between treatments due to casualties of egg stage, nymphal stage and total prematurity stages a significant difference was observed at one percent level, while due to casualties of pupa stage no significant difference was observed. The egg casualties were recorded 7.27 and 27.05 in control and plant extract treatments respectively. The nymphal casualties were recorded 26.59 and 34.86 in control and plant extract treatments respectively. The total prematurity stages casualties were recorded 39.68 and 68.75 in control and plant extract treatments respectively. So *F. Parviflora* as a pesticide plant in pest management can be considered.

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**EFFECTS OF DIFFERENT FERTILIZER TREATMENTS ON THE
PROPERTIES OF ESSENTIAL OIL OF *LIPPIE CITRODORA*
REPELLENCY ON *TRUBOLIUM CASTANEUM***

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Nonchemical methods to control agricultural pests have become one of the most important applications of pest management programs. Some of component in herbal plants, known as secondary metabolisms, can be used as these types of pesticides. The aim of this study is to investigate of the effect of different fertilization treatments on repellency properties of *Lippia citrodora*. These treatments include control, traditional fertilization and balanced fertilization. The experiments were performed at agriculture faculty of Tarbiat Modares University (TMU). Essential oils were extracted through water distillation and compounds were identified using GC/MASS. The compounds like single-ring monoterpene, such as 1, 8-cineole limonene, play an important role in plant resistance to insects. Repellency effect were evaluated in 7 replications, each consisted 10 adults insects, aged between 1 to 7 days, at 25±1 °C, by 65±5 percent relative humidity and in dark situation. After 2 hours, the number of insects in the dishes was counted. The results indicated that “fertilizer treatment efficiency” increased the repellency properties more than the other conducted treatments. Fertilizer treatment efficiency, traditional fertilization and the control showed 70, 62.8 and 38% repellency properties, respectively. Differences between treatment and control at 1%, and between the efficiency and traditional fertilization at 5% significance level were significant. The results showed the fertilizing treatment has a significant effect on repellency properties of *Lippia citrodora*. So, by providing an appropriate condition of fertilizing the repellency property of *Lippia citrodora* can be maximized [1, 2].

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**INVESTIGATION OF PYRIDOXINE PRIMING EFFECTS ON SEED
CARTHAMUS TINCTORIUS GERMINATION AND SEEDLING
GROWTH AND PEROXIDASE & CATALASE ACTIVITY UNDER
DROUGHT STRESS**

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In order to investigation of Pirodoxin effects on germination parameters and seedling growth of *Carthamus tinctorius* L under drought stress, we conducted a factorial experiment design with 4 levels of pirodoxin (0, 0.01%, 0.02% & 0.03%) at 4 levels of drought that prepared by 0, -0.2, -0.4 & -0.6 bar PEG this experiment has done in form of factorial with randomized complete block design (RCB) by 3 treatment. ANOVA of studied traits at germination and seedling growth phases, showed that germination percentage, seed germination and seedling growth rate, root and shoot length decreased dramatically by increasing of drought. Increasing of exogenous pirodoxin concentration led to increasing of shoot length and water tissue content at different levels of drought but it had an inhibitory effect on germination rate. pirodoxin treating increased seedling water content. Enzymes assay showed, Peroxidase & Catalase activity was increased in drought stress conditions and pirodoxin reduced activity of antioxidant enzyme. In brief, the pirodoxin treatment reduced the damaging action of drought on seedling growth and accelerated a restoration of growth processes. With the use results of this experiment and development of researches in related to exogenous application of plant growth regulators can be lead to better understanding about physiological mechanisms of plant tolerance to environmental stresses.



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**EFFECT OF GIBBERLLIC ACID AND ETHANOL ALCOHOL ON
CALENDULA OFFICINALIS L.**

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Pot marigold (*Calendula Officinalis* L.) is an annual and herbaceous plant belong to Asteraceae family that as known medicinal plant. In order to study effect of Gibberllic acid and Ethanol Alcohol on yield and active compounds of *Calendula Officinalis* L. the experiment was conducted at Agricultural and Natural resource research center of Esfahan, in 2012. The experiment was Factorial based on a randomized complete block design with 3 replications. Experiment treatments include of four levels of Gibberllic acid (0, 250, 500, 750) ppm, Three levels of Ethanol (0, 15, 30) %.The result of Experiment showed that Gibberllin on number of flower per plant and plant height and leaf chlorophyll (b) had significant effect and Ethanol alcohol treatment had not significant difference on number of flower per plant and plant height and leaf chlorophyll (b). Mean comparison of interaction of Gibberllin and Ethanol showed that application of 250 ppm Gibberllin without Ethanol had highest number of flower per plant and increase of Gibberllin concentration and Ethanol showed decrease of number of flower per plant. Also with application Ethanol and Gibberllin, leaf chlorophyll (b), increased and the highest of chlorophyll obtain by 15% Ethanol and 750 ppm Gibberllin.

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**EFFECT OF WATER STRES ON THE TYMOL CONTENT IN
THYMUS DAENENSIS CELAK**

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Water deficit is one of the major abiotic stresses, which adversely affects crop growth and yield. The present study investigated the role of water deficit on thymol percentage of *Thymus daenensis* Celak. A completely randomized design was used with five water treatments (100, 85, 70, 55 and 40% of field capacity) with 3 replications. Soil water potential was estimated from data of soil water content, itself derived from pot weight as described by Welcker et al. (2007). The essential oil of the plant dried powder was isolated by hydro-distillation for 3h, using a Clevenger-type apparatus. Quantitative evaluations of the oils were performed by means of GC and GC-MS instruments. The GC analyses were carried out on a Varian (CP 3800) gas chromatograph equipped with a split/ splitless (10:1) injector (290°C) and a flame ionization detector (250°C). The results showed water deficit had significant effect on thymol percentage. Water stress enhanced thymol %, so maximum level of thymol indicated in 40% (58.5%) of field capacity.

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**INVESTIGATION OF SALICYLIC HYDROXYMIC ACID (SHAM)
PRIMING EFFECTS ON SEED *CARTHAMUS TINCTORIUS*
GERMINATION AND SEEDLING GROWTH AND PEROXIDASE &
CATALASE ACTIVITY UNDER DROUGHT STRESS**

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In order to investigation of SHAM effects on germination parameters and seedling growth of *Carthamus tinctorius* L under drought stress, we conducted a factorial experiment design with 4 levels of SHAM (0, 10, 15 & 20 ppm) at 4 levels of drought that prepared by 0, -0.2, -0.4 & -0.6 bar PEG this experiment has done in form of factorial with randomized complete block design (RCB) by 3 treatment. ANOVA of studied traits at germination and seedling growth phases, showed that germination percentage, seed germination and seedling growth rate, root and shoot length decreased dramatically by increasing of drought. Increasing of exogenous SHAM concentration led to increasing of shoot length and water tissue content at different levels of drought but it had an inhibitory effect on germination rate. SHAM treating increased seedling water content. In brief, the SHAM treatment reduced the damaging action of drought on seedling growth and accelerated a restoration of growth processes. With the use results of this experiment and development of researches in related to exogenous application of plant growth regulators can be lead to better understanding about physiological mechanisms of plant tolerance to environmental stresses.



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**HISTOPATHOLOGIC EFFECT OF *RUTA GRAVEOLENS* EXTRACT ON
CHANGES OF GASTRIC TISSUE IN MICE**

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Ruta had been used in different nation traditional medicine specifically in Iranian traditional medicine and marked properties had been mentioned for it. Using common herbal medicine such as Ruta should be followed to not damage in organ by over-use in people. This study had been performed to survey effects of Ruta graveolens extract on histopathologic changes in gastric tissue of mice. This is an experimental study which made on 30 NMRI mice in the weight range of 25 to 35 gr. Mice were divided in 6 quintuple groups. Groups 1 to 4 injected by the doses of 200,300,400 and 500 mg/kg of hydro-alcoholic extracts respectively. Solvent of extract injected in group 5 mice and group 6 mice were intact. The injection was performed intraperitoneal and three times in a week. In the 7th day mice were injected by ketamine-xylisine and were anesthetized deeply then Gastric tissues were extracted and after H&E coloring analyzed pathologically. Different pathologic factors were studied in gastric tissue of mice including atrophy and inflammation by existence of inflammatory cells. There were no significant changes about atrophy factor between groups and control groups. Group 3 has the most inflammation extent which was mild to moderate and peritonitis occurred in one case. In groups one, two and four the inflammation was mild. Also in lymphatic glands of one case in group 2 the inflammation was seen. The histopathological changes were not dose-dependent. It seems that different doses of hydro-alcoholic extract of *Ruta graveolens* had no toxic effect on histopathology of gastric tissue. But overusing of Ruta can predispose the stomach to inflammation and gastritis; so in order to the results using Ruta should be done cautiously. [1,2].

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**EFFECTS OF WEED INTERFERENCE AND PLANT DENSITY ON
MORPHOLOGICAL CHARACTERISTICS AND YIELDS OF
FENUGREEK (*TRIGONELLA FOENUM-GRARCUM*)**

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To determine the appropriate density and weed interference effects of fenugreek in Birjand Islamic Azad University field trial was conducted in the spring of 1390. The factorial experimental design was a randomized complete block design. Treatments included fenugreek plant at 10, 20 and 40 plants per square meter and Weed interference in five levels included weed-free of maturity, 20, 40 and 60 days after emergence, and no weeding. Experimental results showed that the highest and the lowest yield (56.81 and 43.120 grams per square meter) related to treatments of 40 and 10 plants per square meter. Increase their long-term weed reduces yield so no weeding treatment, with an average yield of 42.76 grams per square meter, 55.28 percent of all treatments decreased weed. Increased density reduced weed dry weight was lowest weed dry weight (2057.7 grams per square meter) of treatment was 40 plants per square meter. Interaction between density and weed interference on most characters except grain yield and number of branches was not significant. Based on the results of these tests can be expressed in different densities, 40 plants produced the highest yield.



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**EVALUATION OF GENOTYPE×ENVIRONMENT INTERACTION
ANALYSIS AND ADAPTABILITY OF DIFFERENT ECOTYPES OF
CUMIN AT KERMAN**

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Cumin (*Cuminum cyminum* L.) is known as one of the most important medicinal plants in Iran, and it is one of the earliest known minor spice used by mankind. Failure of genotypes to respond consistently to variable environmental conditions is attributed to Genotype × Environment Interaction (GEI). Knowledge of GEI is advantageous to have a cultivar that gives consistently high yield in a broad range of environments and to increase efficiency of breeding program and selection of best genotypes [1]. For introduce of new crop cultivars, study and identify of genotype and environment intraction in various weather condition, is important [2]. At the present research, adaptability and genotype × environment interaction of cumin using nine different cumin ecotypes in 5 different environments including 5 different sowing dates were studied in Kerman, and morphological characters were evaluated as well. The obtained results indicated that there is a significant interaction effect between genotype and environment for seed yield which was high change in value interaction for this character. In order to assess the adaptability, linear regression coefficient based on environmental index, was calculated. According to the results, there was a significant difference among regression coefficient values and Kerman ecotype with $b=2.258$ had the highest coefficient, and in other words it showed the highest specific adaptability to favorable environments. On the contrary, Semnan ($b= -0.098$) and Khorasan jonoubi ($b=0.272$) showed the highest specific adaptability to unfavorable environments whereas Isfahan ($b=1.006$), Pars ($b=1.144$) and Khorasan shomali ($b=1.189$) ecotypes did not show any significant difference with $b=1$, and those ecotypes had optimum general adaptability. Considering high yield of the mentioned ecotypes, so they can be introduced as ideal adaptable ecotypes for further scientific study and the introducing to the farmers.

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EFFECTS OF METHANOL AND BIO-STIMULATORS AS GROWTH PROMOTERS FOR BIOMASS AND GROWTH CHARACTERS OF SAVORY (*SATUREJA HORTENSIS* L.)

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Savory is one of the most important medicinal and spice plants cultivated in many parts of the world. In order to investigate the effects of foliar application of methanol and Bio-stimulators on the biomass and many growth traits of savory, a factorial experiment based on randomized completely blocks design with three replications in research greenhouse of Institute of Medicinal Plants (IMP) was carried out. The methanol concentrations in four levels (0, 15, 30, and 45 %v/v) and types of bio-stimulators in four levels (Control, Aminolforte, Fosnutren, and Kadostim; at 1.5 liters per hectare for each) were done. The results showed that the interaction of methanol and bio-stimulators had significant effects on leaf fresh and dry weight, stem fresh and dry weight, root fresh and dry weight and shoot fresh and dry weight ($p < 0.01$). Of course, it hadn't significant effect on the plant height. But, the effect of bio-stimulators on the plant height ($P < 0.05$) was individually significant. The maximum amount of leaf fresh weight and shoot fresh and dry weight in interaction treatment of 15% methanol and Aminolforte were observed. The maximum amount of leaf dry weight was related in interaction treatment of 15% methanol and Kadostim. The maximum mean of root fresh weight was obtained in interaction treatment of 45% methanol and Kadostim. The maximum value of root dry weight was seen in interaction treatment of 15% methanol and Fosnutren. The maximum amount of stem fresh weight and stem dry weight were obtained in interaction treatment in 30% methanol and Aminolforte, and 30% methanol and Kadostim, respectively. Also, the longest and shortest plant height was related in Kadostim and control treatment, respectively. Overall, this study can be concluded that foliar application of methanol solution and bio-stimulators increased the biomass and growth of savory [1-3].

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**MICROWAVE IRRADIATIONS EFFECT ON AMOUNT OF PHENOLIC
COMPOUNDS OF *MARRUBIUM ANISODON***

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In Iran the genus *Marrubium* of family Lamiaceae is represented by 10 species, including *Marrubium anisodon* C. Koch [1]. There are few researches of active components of this plant using modern techniques. The aim of this work is to investigate the effect(s) of microwave irradiation time on the phenolic compounds of this plant. Phenolic antioxidant activity led to establish that antioxidants can prevent oxidative damage. Flowers and stems of this plant were extracted under microwave irradiation from 10 to 60 minutes using water solvent. The total phenolic content was measured as gallic acid equivalent via Folin-Ciocalteu method [2, 3]. The results show that the plant has considerable value of phenolic but the time of irradiation has no considerable effect on the content of phenolic.

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EVALUATION OF THE EFFECTS OF ETHANOL AND GIBBERRELIC
ACID ON MORPHOLOGICAL TRAITS OF
ECHINACEA PURPUREA (L.) MOENCH

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Echinacea purpurea (L.) Moench as a perennial herbaceous of Asteraceae family is one of the basic antimicrobial herbs. Echinaceae is popularly believed to be an immunostimulator medicinal plant, which is widely used for the prevention and treatment of colds, respiratory infections, wound healing, and has shown promising results in the relief of common cold symptoms and the time taken to improvement. In order to evaluate and determine the most appropriate concentration of Ethanol and Giberrellic Acid (GA₃) on the height of bush, leaf area, leaf length, leaf width, flower height and flower diameter, a pot experiment was conducted as factorial plan based on the randomized completed blocks with five replications and sixteen treatments in Isfahan Agricultural Research Center in Feb 2011. The treatments included four levels of Ethanol (%0, 10, 20, 30) and four levels of GA₃ (0, 10, 50, 100 mM). In the experiment, distilled water was used for control treatment (%0 Ethanol and 0 mM Giberrellic Acid). The mean comparison of control versus Ethanol and GA₃ treatments was significant for whole characters except The mean comparison of interactions between Ethanol and GA₃ showed that the highest height of bush occurred by application of %30 Ethanol and 100 *milimolar* Giberrellic Acid. The highest and the lowest leaf area, leaf length and leaf width obtained by using %10 Ethanol and 100 mm GA₃, and application of %20 Ethanol without using GA₃, respectively. The highest flower height and diameter was seen in %10 Ethanol and 100 mm GA₃. Therefore, in order to acquire the highest flower and leaf vegetative growth, the application of %10 Ethanol and 100 mm GA₃ is suggested. The mean comparison of Ethanol versus control resulted in significant difference on bush height, the area, length and width of leaf and flower diameter. The results of variance analysis indicated that different levels of Ethanol had significant effect on flower diameter. Also, the results showed the significant effect of different levels of GA₃

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**EVALUATION OF THE EFFECTS OF ETHANOL AND GIBBERRELIC
ACID ON CHEMICAL COMPOUNDS OF
ECHINACEA PURPUREA (L.) MOENCH**

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Echinacea purpurea (L.) Moench is a perennial herb which belongs to Asteraceae family. Echinacea, better known as purple coneflower, has received a global attention because of its increasing medicinal value. It's considered to be the most effective detoxicant in Western herbal medicine for the circulatory, lymphatic and respiratory systems and is widely used in modern herbal treatments. In present study, in order to evaluate the effect of Ethanol and GA₃ on chemical compounds of *Echinacea purpurea*, a pot experiment accomplished as factorial plan based on the randomized completed blocks with five replications and sixteen treatments in Isfahan Agricultural Research Center in Feb 2011. The treatments included four levels of Ethanol (0, 10, 20, 30) and four levels of GA₃ (0, 10, 50, 100). The mean comparison confirmed that the interactions between Ethanol and GA₃ has significant effect on chemical compounds included Chlorophyll a, Chlorophyll b, Chlorophyll a+b, Carotenoid and anthocyanin. Furthermore, the mean comparison of interactions showed that the highest content of Antocyanin and Carotenoid is resulted by treating %30 Ethanol and 100 mM Gibberelic Acid. The Chlorophyll a+b content increased by increasing the level of Gibberelic Acid in equal levels of Ethanol. This confirms the high effectivity of GA₃ on increasing the Chlorophyll a+b content.

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**NEW REPORT OF *FUSARIUM SP.* CAUSING LEAF SPOT
ALOE VERA IN NORTH OF IRAN**

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Aloe vera is an important medicinal plant from Liliaceae family which, nowadays it is planted in many glasshouses of Tonekabun city in the north of Iran. The plant is a perennial drought resistant succulent plant. A leaf spot disease was observed on *Aloe vera* plants in Tonekabun city glasshouses as small, circular to oval dark brown necrotic sunken spots on the leaves. The spots located mostly on the leaf tip, the tips of the leaves mostly become rotten and dried. The incidence of leaf spot disease was observed by the average 37.5 percent in each pots in the glasshouse. Infected tissues collected from different sites in diseased pots were cultured on potato dextrose agar medium (PDA), and the pathogen was identified as *Fusarium sp.* on the basis of morphological and cultural characteristics. The colonies on potato dextrose agar had pale pinkish-salmon-colored mycelia. Macroconidia were mostly 3-septate, slightly curved, Microconidia were unicellular, oval to reniform. Pathogenicity tests conducted on healthy potted aloe plants in a glasshouse showed typical leaf spot symptoms after four to seven days. This is the first report of a leaf spot disease of aloe in north of Iran.

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**EFFICACY OF REPELLENCY PURE ESSENTIAL OILS AND
FORMULATION OF NANOENCAPSULATED ESSENTIAL OIL OF
CARUM COPTICUM ON DIAMONDBACK MOTH LARVAE**

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Controlled release by nanoencapsulated essential oil seems to be the best choice for increasing the efficiency and minimization of environmental damage. In this work, efficiency of nanoencapsulated essential oil of *Carum copticum* C. B. Clarke was tested on repellent activity of *Plutella xylostella* L. Several concentrations were prepared and then third instars larvae were introduced into each treatment. Then, repellent activity was determined after 1, 3, 6, 12 and 24 h from commencement of exposure. Results showed that the nanocapsule of *Carum copticum* oil was shown here to possess more repellent activity to *P. xylostella* compared to pure oil before formulation. The repellent activity varied with application method and concentrations and exposure time, our results showed higher repellent rates in nanocapsule than in essential oil due to controlled-release formulations allowing smaller quantities of essential oil to be used more effectively over a given time interval. The reasons for nanocapsulating the essential oil have been to improve its stability to reduce side effects or to reduce dosing frequency and total dosing amount, to obtain better repellent activity, and for sustained (long-lasting) release. Therefore, the nanocapsulation of essential oil might provide a new method for the management of *P. xylostella*.

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EFFECT OF DIFFERENT IRRIGATION LEVELS ON YIELD, YIELD COMPONENTS AND ESSENTIAL OIL CONTENT OF BASIL HERB (*OCIMUM BASILICUM* L.)

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In order to evaluate different irrigation levels on yield, yield components and essential oil of basil herb (*Ocimum basilicum* L.) pilot randomized complete block design with three treatments and three replications. To run this test plots with dimensions of 6 × 2 and 1 m spacing between plots and 2 m between repetitions was guarding. Used to apply irrigation water deficit every 4 days, 8 days and 12 days respectively. Variables measured included plant height, stem diameter, the total number of sub-branches, inflorescence height, inflorescence diameter, biomass, inflorescence dry weight, grain yield per plant, harvest index inflorescences per plant, number of inflorescences per plant weight, seed weight per plant and were essential. Effect of different irrigation levels had significant differences in surface of a percent. In most cases, treatment had the highest yield 4 days irrigation and irrigation 12 days had the lowest value. Most of the oil was in the water for 8 days. The results showed that the basil plant irrigation showed the best performance over short distances.

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EFFECT OF *ALOE VERA* GEL ON QUALITY ATTRIBUTES AND STORAGE LIFE OF FRESH-CUT NECTARIN CV “RED GOLD”

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Because of the harmful effects of the chemicals on human health and environment, the use of these compounds is recently restricted and it is necessary to use the safe compounds in postharvest technology of fruits and vegetables. In this study, the effect of *Aloe vera* gel (at concentrations of 0, 25 and 33 %) on postharvest life and quality of Red Gold nectarin fresh-cut fruit during storage at 0/5°C with 90-95 % RH for 21 days was studied. Weight loss, marketability, decay incidence, total acidity, total soluble solids and vitamin C were evaluated. The treatment of fruit with 33% *Aloe vera* Gel significantly maintained fruit quality at the end of the storage. The results showed that 33% *Aloe vera* gel treatment preserved vitamin C. Both 33% *Aloe vera* gel treatment decreased fruit postharvest decay. In addition, the results indicated that the use of *Aloe vera* gel maybe introduced as an effective and successful strategy in postharvest technology of the Red Gold nectarin fresh-cut fruit.

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**EVALUATION OF THE EFFECTS OF IRRIGATION FREQUENCY AND
GLYCIN BETAINE ON QUALITATIVE AND QUANTITATIVE TRAITS
IN *DRACOCEPHALUM MOLDAVICA* (L.)**

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Moldavian balm (*Dracocephalum moldavica* L.) is an annual plant which belongs to the Lamiaceae family. It's known as an appetizer and tranquilizer. This experiment was conducted in order to study the effects of different levels of Irrigation frequency and Glycinebetaine (GB) on Chlorophyll a, Chlorophyll b, Chlorophyll a+b, Carotenoid, Relative water content, Plant height, dry and wet weight of plant in split plot design with three replications and two factors. Main factors consisted of Irrigation frequency in three levels consisted of (irrigation at 30, 60, 90 mm evaporation pan class A) and subplots included foliar application of GB with four levels (0, 40, 80, 120 miliMolar) in two stages of vegetative growth in April 2012 in Isfahan Agricultural Research Center. The results of variance analysis of Irrigation frequency and GB on studied traits showed that Irrigation frequency had significant difference on plant height, dry weight and wet weight of plant. The variance analysis of interaction effect of GB and Irrigation frequency had significant difference on plant height, Chlorophyll a, Chlorophyll b, Chlorophyll a+b, dry weight and wet weight of plant. According to mean comparison of different levels of irrigation, decreasing in whole traits by increasing the irrigation intervals was seen. Height, dry weight and wet weight of plant significantly decreased. The mean comparison of GB showed that the height increased by increasing the usage of GB. Wet and dry weight of plant showed non significant effect. The mean comparison of interactions on dry and wet weight of plant indicated that the highest amount of wet and dry weight is resulted by irrigation frequency of 30 mm evaporation pan and using 80 mM GB. It can be resulted from this study that the Stress has negative effect on whole traits and GB has decreased that effect significantly.

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**EFFECTS OF NEEM EXTRACTS ON CARBOHYDRATE RESERVES IN
ADULTS OF SUN PEST (*EURYGASTER INTEGRICEPS* PUT)**

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Neem is a tree that is commonly used for its medicinal properties. The bark, seeds, oil, leaves, and other parts of the tree are used to make a variety of different herbal remedies. Additionally, neem oil is used as a natural pesticide, and the plant's twigs are used as natural [1]. The goal of this experiment is to determine the effects of neem extracts on sugars and glycogen reserves in Sun pest. So in this experiment, adults sprayed with specific concentration of neem extract (100, 300, 500 and 0 ppm) in field conditions and adults were sampled in 3, 6 and 12 days intervals after spraying. The Sugar and glycogen quantity of four males and females, separately, determined with Van Handel method [2]. Data were analysed in factorial trial in randomized complete design. Results showed neem spraying significantly affected on concentrations and sampling time intervals significantly affected on sugar and glycogen ($p < 0.001$). So the highest amount of glycogen observed in 300 ppm of female during 6 days after Spraying with mean (187.539 ± 11.088 mg/g) and the lowest is in 100 ppm of male during 12 days after Spraying with mean (9.790 ± 11.088 mg/g). Also the highest amount of sugar is in 0 ppm during 3 days after Spraying with mean (31.627 ± 1.8693 mg/g) and the lowest was in 300 ppm during 12 days after Spraying with mean (3.937 ± 1.8693 mg/g). Also Interaction effects between sex, Sampling times and concentrations in glycogen were significant ($p < 0.001$). Results indicated that sugar and glycogen in adults of Sun pests could be affected by neem extract.

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RESPONSE OF *NEPETA POGANOSPERMA* TO DROUGHT STRESS

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In modern agriculture, finding the effective factors on plant growth and yield and their negative impacts is important for sustainable production. Abiotic stresses are important factors affecting yield production in agriculture. To study the effect of drought stress on the morphology of *Nepeta poganosperma*, this experiment was conducted in 2012 at Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. Experimental design was randomized complete block design with three replications. Treatments included drought stress levels induced by irrigating the field at 30, 60 and 90% of the field capacity (FC). Analysis of variance indicated that drought stress significantly affected leaf width and the number of inflorescences at $P \leq 0.05$ and leaf length, the number of flowering stems, total number of stems, single plant yield and shoot yield at $P \leq 0.01$. Mean comparison showed that the highest leaf width (15.5 mm), leaf length (40.5 mm), the highest number of flowering stems (37.83) and the total number of stems (76.38) were achieved in non-stressed treatment (90% FC). Shoot yield was the highest (3391 kg/ha) in 90% FC and the lowest (2453 kg/ha) in 30% FC. This experiment generally indicated that *Nepeta poganosperma* gave the highest yield in non-stressed treatment, so, it is recommended to study the effect of drought stress on essential oil percentage and yield in order to determine the real water requirement of this plant.



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**ANTIBACTERIAL EFFECT OF *PISTACIA KHINJUK* EXTRACT
AGAINST SOME GRAM POSITIVE AND NEGATIVE BACTERIA**

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The antibacterial activity of *Pistacia khinjuk*, one of the three species *Pistacia* growing in Iran that are in traditional medicine used as antibacterial, anti-inflammatory, antipyretic, in treatment diarrhea and throat infection, against *Staphylococcus aureus* (ATCC:25923), *Escherichia coli* (ATCC:25922), *Pseudomonas aeruginosa* (ATCC:27853) and *Listeria monocytogenes* (ATCC:1298) was Detected using the micro-broth dilution method. The minimum inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) values for bacteria were determined. The results showed that MIC for *Staphylococcus aureus* was (≥ 3.9) $\mu\text{g/ml}$ and MBC was (≥ 7.81) $\mu\text{g/ml}$, MIC and MBC (≥ 250) $\mu\text{g/ml}$ was recorded for *Listeria monocytogenes*, MIC and MBC for *E.coli* and *P.aeruginosa* were respectively (≥ 31.25) and (≥ 62.5) $\mu\text{g/ml}$. Disc Diffusion Susceptibility Methods also was performed to confirm the results. In this method extract's disc were compared with appropriate antibiotics discs and the zone of inhibition was recorded. The zone of inhibition in extract's disc for *S.aureus*, *E.coli*, *P.aeruginosa* and *L.monocytogenes* were respectively 16mm, 14mm, 20mm and 18mm. The zone of inhibition in Penicillin against *Staphylococcus aureus*, Gentamicin against *P. aeruginosa*, Ciprofloxacin against *E.coli* and *L.monocytogenes* were 17mm, 21mm, 29 and 22.5 mm. The results of this study suggest that extracts of *Pistacia khinjuk* could be suitable for the treatment of various infections caused by *P. aeruginosa*, *L.monocytogenes*, *S. aureus* and *E. coli*

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**EVALUATION OF THE EFFECT OF CROPPING TIME AND CLIMATE
ON AMOUNT OF ESSENCE IN *MENTHA PIPERITA***

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Mentha piperita is one the medical plants that has been in particular attention in Iran in recent years and significant efforts has been taken to increase its cultivation area. The useable part this plant is its leaves and its essence has a substantial amount of menthol. This case study aims to evaluate the effect of harvesting time on the amount of essence of *Mentha piperita* in three regions with different climates including Mashhad, Nishabur, Bojnourd. Plants cultivation were carried out in rows and irrigated every week. Tillage, land preparation and fertilization were done followed the area's conventions with a same management. The amount of essence was evaluated in harvesting plants in three cropping times during the years of 1389 and 1390. The greatest amount of essence was observed in the second cropping time in both consecutive years which 20% of essence has been gained. This observation showed the effect of cropping on the amount of essence. From three studied regions, Bojnourd had the maximum amount of essence in the second cropping and Nishabur and Mashhad settled after, respectively. The higher amount of essence in Bojnourd compared to the other two regions indicated the influence of climate on the amount of essence in *Mentha piperita*. According to the results of this study, in order to have the best results both climate and cropping time must be considered.



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**CHEMICAL COMPOSITION, ANTIBACTERIAL AND ANTIOXIDANT
ACTIVITY OF THE ESSENTIAL OILS FROM AERIAL PARTS OF
THECOCARPUS MEIFOLIUS GROWING IN IRAN**

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The aim of this research was to study the essential oil composition of *Thecocarpus meifolius* one specie of the genus *Thecocarpus* by GC-Mass analyse and its coherence with antibacterial activity. These results can be used to investigate the optimal using of this plant for relevant industries. The aerial parts oil of *Thecocarpus meifolius* contained 27 compounds with a yield of 1.00% (w/w), representing 97.95% of the total oil. Major components were identified in the aerial parts oil were Spathulenol (31.32%), α -Eudesmol acetate (6.13%) and Salvia-4(14)-en-1-one (5.56%). The antibacterial capacity [1] of the oil of aerial parts from *Artemisia lehmaniana* was screened against three bacterial strain. The oil mildly inhibited the growth of microorganisms. The antioxidant activities are evaluated using DPPH free radical scavenging assays [1] (IC₅₀: 3.7 mg/mL). This plant was shown the high antioxidant activities.

Antimicrobial activities of *Thymus migricus* essential oil

Microorganism(PTCC ^a Certificate)	MIC ^b	MIC of ref. ^c
<i>Escherichia coli</i> (1533)	128	16
<i>Pseudomonas aeruginosa</i> (1310)	128	8
<i>Staphylococcus aureus</i> (1431)	64	16

^aPersian type culture collection (PTCC), Tehran, Iran. ^bMIC: Minimal inhibitory concentration(μ g/ml).
^cAmpicillin and Tetracycline Fluconazole were used as references for Gram-positive and Gram-negative bacteria, respectively.

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**IDENTIFICATION AND DIVERSITY OF MEDICINAL PLANTS IN
TONEKABON FORESTS, MAZANDARAN**

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Non-timber products have indirect benefits for forests, in which due to their importance in the chemical and pharmaceutical industries are highly regarded in most countries. Iran forests have the high potential in producing of non-timber products, and benefits of these products is locally known from the past. The subject of this study was medicinal plants and biodiversity in Tonekabon forest. To achieve this goal, a transect was used, in each 150 m one 400 m² plot was taken along transect. The collected medicinal plants were identified in the herbarium by using different floras. The analysis of the medicinal plants diversity was conducted using Shannon - Wiener index. The results indicated that 26 species are medicinal among identified species, and species diversity was high, and increased with increasing elevations along transect.

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**IDENTIFICATION, COLLECTION, CONSERVATION AND
DETERMINATION GEOGRAPHICAL DISTRIBUTION OF
WITHANIA COAGULANS GENETIC RESOURCES IN IRAN**

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The genus *Withania* is a member of family Solanaceae and consists of 23 species, two species namely *Withania coagulans* Dunal and *W. somnifera* Dunal occurs in Iran. *W. coagulans* (Linn.) Dunal are distributed in just some natural habits of Baluchestan region, Sistan and Baluchestan province, Iran. Recognition of plant genetic resources, investigation of ecological and morphological conditions, and determination of geographical position of the plant species seem to have a special importance. Presence of secondary metabolites and conversely their activities seriously affected by environmental factors like geographical location, fertility of cultivar, part used, season and time of collection. To dense cultivation on farm land and using *W. coagulans* in medicinal industries it is essential to introduce ecological characteristics. For this study, 20 accessions were collected from these native habits of Sistan and Baluchestan province Iran, in 2012. In sampling site, different parameters like codominant plants, climate characters and Physico-Chemical analysis of the soil were determined. Soil samples were collected at 30cm depths in three replicates from each accession and characteristics such as texture, acidity (pH), Electrical conductivity (EC), organic carbon (O.C), total nitrogen, potassium, phosphorus were measured. The results showed that *W. coagulans* occurs mainly in Khash, Saravan, Sarbaz, Ghost, and Iranshahr from 600-1500 m above sea level. More than 45% of distribution was occurred 1200-1400 m above sea level. The climate is generally dry and classified as arid and subtropical. The main codominant plants were *Rhazya stricta*, *Calotropis procera* and *Nannorrhops ritchiana*. Habit soil was sandy loam, with pH=7.5-8.1 and EC=0.5-5.2. The seed samples from each accessions was collected, planted and partly maitance in seed bank of medicinal and aromatic plant research center of Sistan and Baluchestan University for more study.

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**EVALUATION OF CULTURE SUBSTRATE ON SEED GERMINATION
OF MARSH MALLOW, *ALTHAEA OFFICINALIS***

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Marsh mallow, is one of important medicinal and ornamental plants in Iran that its cough suppression effect have been well documented (1). Reduction in germination and desirable establishment of seedlings is one of the farmers' problems and selection of suitable culture substrate could improve establishments of plants in unenviable condition. The culture substrate affect significantly on seed germination rate and percentage. The aims of the research were to select suitable culture substrate to shorten the period of seed germination and increase in total seed germination percentage. In this case, greater number of seedling could be prepared in shorter period. In this regard, germination of marshmallow seeds were studied in a completely randomized design experiment with four culture substrate including cocopite , tea residual, leaf composts and washed sand. The maximum germination percentage and rate was observed in tea residual substrate that indicated significant difference with other substrate. Based on germination percentage and rate, leaf composts, cocopite and washed sand settled after tea residual, respectively. The results indicated that tea residual is more suitable substrate for seed germination of marshmallow plants in compared to other tested substrate culture.

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**EFFECTS OF DIFFERENT OF NITROGEN FERTILIZERS AND
MANURE ON PHYIOLOGICAL TRAITS ON BALANGU SHIRAZI
(LALLAMENTA ROYLEANA)**

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In general, chemical fertilizers and manure can increase the amount of nitrogen and other micro-nutrients, chlorophyll a marked increase and ability to absorb sunlight, photosynthetic production and ultimately increase plant growth and yield. In order to plant crops Balangu Shirazi as a medicinal plant and few research that has been done, in this case tested in a randomized complete block design with sixteen major plot farms in 3 replicate, at University Research Center of Medicinal Plants at year 1391. Four levels of nitrogen fertilizer, urea fertilizers (0-30-60-90 kg/ha) and four well-rotted manure (0-10-20-30 ton / ha) and combine them. Traits such as leaf area, chlorophyll a and b, the ratio of chlorophyll a to b and total chlorophyll concentrations were measured. The results showed that different levels of manure and chemical and combining the characteristics of chlorophyll a, chlorophyll b, than chlorophyll a / b was not significant but was significant on total chlorophyll content. There was no significant effect of manure on the leaf surface, but the combination of fertilizer and chemical fertilizer on the leaf surface was significant at the 5% level. Among the surface treatments of nitrogen treatments (30 kg /ha) and fourth level of integrating manure (30 t/ ha) and second-level fertilizer (30 kg /ha) accounted for the greatest amount of leaf area.

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**EFFECT OF PLANT ESSENTIAL OILS ON MYCELIAL GROWTH OF
FUSARIUM GRAMINEARUM IN LABORATORY CONDITION**

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Species of *Fusarium* incite head blight and foot & root rot in wheat and barley. Among them *F. graminearum* is the predominant species in many countries throughout the world. A number of *Fusarium* strains produce mycotoxin, which is of great concern as a health hazard. Vomiting, refusal to eat, precocious sexual, uterine prolapsed, abortion and cancer are the problems which were reported in pig. Chemical pesticides, antagonist microorganisms and plant essential oils with antimicrobial properties are effective on growth inhibition of pathogenic fungi. So their in-vitro tests for initial selection are necessary and effective for greenhouse or field evaluation. In the present study effect of *Mentha piperita*, *Satureja hortensis*, *Ferula gummosa*, *Citrus medica* var. *sarcodactylis*, *Foeniculum vulgare* and *Allium sativum* were evaluated on growth inhibition of *F. graminearum*. For this purpose essential oils of above mentioned plants were prepared at concentrations of 12.5, 25 and 50 PPM, mixed with the autoclaved PDA and plated in Petri dishes. After cooling, the plates were inoculated with a small piece of mycelium taken aseptically from the 7-10 days old culture of *F. graminearum*. Control plates were inoculated as the same method, which contain only PDA media. Inoculated Petri dishes were incubated at 25 ± 1 °C. The treatments were assessed in the basis of their inhibitory zone of mycelial growth, when the control plates showed the maximum growth of the fungus. The results indicated that *Mentha piperita*, *Satureja hortensis*, *Ferula gummosa* and *Citrus medica* var. *sarcodactylis* could inhibit the mycelial growth of the fungus in concentrations of 50, 12.5, 50, 50 ppm respectively in compare with control plates and other treatments.

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INVESTIGATION OF THE EFFECT OF SUBSTITUTING ALFALFA WITH THYME (*THYMUS VULGARIS*) EXTRACTION BY-PRODUCT IN RUMINANT NUTRITION USING GAS PRODUCTION TECHNIQUE

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Thyme (*Thymus vulgaris*) is one of medicinal herbs in the Lamiaceae family, cultivated worldwide for its culinary, cosmetic and medical purposes. Predominant compounds of thyme include thymol and carvacrol that have been identified for their strong antibacterial effects. Thyme functions as an antispasmodic, expectorant, antiseptic, antimicrobial and antioxidant [1]. Aims of this study were to evaluate the effect of substituting alfalfa with thyme (*Thymus vulgaris*) extraction by-product after 96 h incubation using gas production. Treatment One (T₁) included a 50 percent concentrate and 50 percent alfalfa as a source of forage, followed by Treatment Two (T₂) and Three (T₃), in which half of the alfalfa and 100% of the alfalfa was completely replaced with thyme extraction by-product, respectively. In the glass vials used to measure gas production, 30 mg of buffered rumen fluid (2:1 ratio of rumen fluid: buffer) was poured into the glass and cultured at 38.6 temperature [2]. Volume and pressure of produced gas were measured with syringes and a digital pressure meter at different times. An exponential model was used to determine the gas production parameters. There was a significant reduction (P<0.5) in b parameter between T₁, T₂ and T₃ which were 72.5, 73.3 and 64, respectively. Also, a significant reduction (P<0.5) was shown in cumulative gas production between those treatments of 24, 48, 72 and 96 h after incubation. This may be due to the fact that thymol has microbial inhibition metabolism. IVOMD was significantly (P<0.5) lower in T₃ than T₁ and T₂ which were 67.7, 69.8 and 68.9, respectively. A decrease in gas production corresponded with a decrease in methane production, that lead to a decrease in volatile fatty acids and increase in microbial protein mass, thus it could be useful for feedstuff. Also, the use of thyme lead to a decline in an environmental effect from ruminant nutrition. This data indicates that thyme can be replaced with some parts of alfalfa.

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**EFFECT OF CHEMICAL AND BIO FERTILIZERS ON BALM
(*MELISSA OFFICINALIS*) MORPHOLOGY AND SHOOT YIELD**

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Since balm (*Melissa officinalis*) is a high value medicinal plant with high need to mineral nutrients, this experiment was conducted to improve balm growth and yield by biofertilizers application, in 2012 at Alborz research station, Research Institute of Forest and Rangelands, Karaj, Iran. Experimental design was factorial in the form of a randomized complete block design with three replications. Treatment included (1) with and without inoculation of *Azotobacter chroococcum* + *Azospirillum lipoferum* + *Pseudomonas putida*, and (2) 0 and 200 kg triple superphosphate/ha. Analysis of variance indicated that biofertilizer significantly affected plant height, the number of tillers, the number of sub-sub stems, canopy diameter, the number of leaves, inflorescence length, yield, shoot yield and stem yield at $P \leq 0.01$, and internodes length and canopy circle at $P \leq 0.05$. Chemical fertilizer had only a significant effect on plant height at $P \leq 0.05$. Mean comparison indicated that plant height (36.65 cm), the number of tillers (18.09) and the number of sub-sub stems (230.53) were the highest in the inoculated treatment; however, internodes length (2.61 cm) was the highest in non-inoculated treatment. The highest canopy circle (65.8 cm), canopy diameter (20.9 cm), the number of leaves (2022.5), inflorescence length (18.99 cm), total shoot yield (624.06 kg/ha), leaf yield (448.59 kg/ha) and stem yield (175.46 kg/ha) were achieved when biofertilizers were applied. Results generally indicated that inoculating plants with biofertilizers increased plant growth and yield.



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**EFFECT OF DIFFERENT LEVELS OF CRUSHED BLACK SEED
(*NIGELLA SATIVA*) ON SOME BLOOD PARAMETERS IN
LAYING HENS**

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Nowadays, the possibility of using new natural alternative additives instead of antibiotics in poultry rations is being researched. One of the alternatives is represented by medicinal plants such as *Nigella sativa* seeds. The herbs have antiviral properties and stimulate the endocrine and immune system [1]. The essential oils of this plant have many biological properties including antiparasitic [2], antidiabetic, antibacterial, antifungal, antihelminthic, antineoplastic, antidiabetic, bronchodilator, immune enhancing and antispasmodic effects anticoccidial, antioxidant [3] and cholerectic [4] activities. The black seed *Nigella sativa* (*N. sativa*) is a type of plant that belongs to the Ranunculaceae family [5]. *Nigella* contains 35-40 % oil, bitter substances, saponins, volatile fats, tannin, nigelon and thymochinon [6]. Thus, this study was performed to investigate the Effect of different levels of crushed black seed (*Nigella sativa*) on some blood parameters in laying hens. One hundred and forty 30-wk-old commercial Egg laying type Hy-Line(W36) were randomly assigned into 4 treatments with 5 replicates and 8 birds per each. Treatments were a control diet (0.0% crushed black seed) and diets containing 1, 2 and 3 % crushed black seed. This study lasted 10 weeks. At end of the experiment 1 bird from each replicate were randomly selected to evaluate the blood serum glucose, triglyceride, cholesterol, LDL and HDL. Finally data were analyzed by the GLM procedure of SAS. Duncan's multiple range tests was used for comparison of means ($P < 0.05$). The results indicated that none of treatments included diet with levels of 1,2 and 3 % crushed black seed compared with control group were not significantly on triglyceride, cholesterol, LDL and HDL. between amounts of glucose in whole treatments was significantly difference compared with control group, although level of blood glucose in all treatments were significantly reduction than control group. It was concluded that the addition different levels of crushed black seed improve some blood parameters.

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**EFFECT OF CHEMICAL AND BIOLOGICAL SOURCES OF SULFUR
ON BALM (*MELISSA OFFICINALIS*)**

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This experiment was conducted in 2012 at Alborz research station, Research Institute of Forest and Rangelands, Karaj, Iran. Experimental design was factorial in the form of a randomized complete block design with three replications. Treatments included *Thiobacillus thioparus* (with and without inoculation) and chemical sulfur applied as sulfur bentonite (0 and 500 kg/ha). Analysis of variance indicated that *Thiobacillus* significantly affected plant height, the number of tillers, the number of sub (lateral) stems, the number of sub-sub stems, shoot yield and stem yield at $P \leq 0.01$, and canopy diameter, the number of leaves inflorescence length and leaf yield at $P \leq 0.05$. Sulfur application had only a significant effect on the number of tillers at $P \leq 0.01$. Mean comparison showed that the highest plant height (35.55 cm), the number of tillers (16.83), the number of sub stems (34.39), the number of sub-sub stems (23.22), canopy diameter (20.4 cm) the number of leaves (180.4) and inflorescence length (18.07 cm) were achieved in the inoculated treatment. The highest shoot yield (604.68 kg/ha), leaf yield (429.73 kg/ha) and stem yield (174.94 kg/ha) were achieved in the inoculated treatment. Results of this experiment generally indicated that *Thiobacillus thioparus* can effectively improve plant growth and yield.



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EFFECT OF DIFFERENT SEED HARVESTING TIMES ON SEED GERMINATION AND SEEDLING EMERGENCE INDICES OF RUMEX (*RUMEX TUBEROSUS* L.)

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The original importance of *Rumex* genus (Polygonaceae) was based on its biological activities, such as antimicrobial, antiinflammatory, antidiarrheal and antiviral properties, among others. *Rumex tuberosus* L. is a native herb, growing spontaneously in Northeast Iran, where its leaves are highly appreciated and consumed. Despite the high consumption, its knowledge is inconsiderable. So far, no attempt has been performed for its domestication. To obtain the best seed harvest time for good seed germination and seedling emergence of *rumex tuberosus*, the seeds of plant were collected four stages (20, 50, 70 and 150 days after fruiting stages (DAF)) from their natural habitats and cultured straightaway separately under same condition (20 °C and Indirect light in cocopeat medium under greenhouse conditions). The experiment was based on completely randomized design with four replications and 50 seeds per replicate. The results showed that the highest seedling emergence percentage and rate was in the seeds which collected 150 DAF (98.0 % and 13.12, respectively) and the lowest of these traits obtained in the seeds harvested 20 days after fruiting (54% and 4.63, respectively). The highest and lowest of seedling survival percentage was obtained in the seeds collected 150 (86.6 %) and 20 (35.3 %) DAF, respectively. The reason for these results might be due to non-physiological dormancy of the *rumex tuberosus* seeds which has been eliminated in the seeds collected 150 DAF and remained in the seeds collected 20 DAF.

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**EFFECT OF DIFFERENT LEVELS OF CRUSHED ANISE
(*PIMPINELLA ANISUM* L.) ON EGG QUALITY PARAMETERS IN
LAYING HENS**

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Poultry industry is one of the most dynamic branches of world agribusiness trade. Antibiotics are frequently used for the treatment and control of diseases and even as growth promoters to improve poultry performance and improving feed efficiency from 1 to 5%. Nowadays, the possibility of using new natural alternative Phytogetic feed additives instead of antibiotics in poultry diets as growth promoters to improve performance being researched. used in poultry feeding of poultry. Anise (*Pimpinella anisum* L.), is a member of the Apiaceae family, is an annual aromatic plant, native to the eastern Mediterranean and southwestern regions of Asia, that is listed by the Council of Europe as a natural source of feed flavoring and in the USA it is considered as GRAS, i.e. Generally Recognized As Safe. PA seed contains eugenol, methylchavicol, anisaldehyde and estragole and trans-anethole – a powerful phytoestrogen which is the main component of the oil (80-95%). Anise has been examined for its antiparasitic and digestion stimulating properties, as well as its antibacterial, antifungal, antipyretic, antioxidant, antimicrobial, anthelmintic and hypocholesterolemic activities. An experiment was conducted to evaluate the Effect of different levels of crushed Anise (*Pimpinella anisum* L.) on egg quality parameters in laying hens. This experiment was conducted for 10 months, Including 2 weeks adaptation, and 8 weeks sampling. One hundred and forty 27-wk-old commercial Egg laying type Hy-Line (W36) were randomly assigned into 4 treatments with 4 replicates and 8 birds per each. Treatments were a control diet (0.0% fennel essence) and diets containing 1, 2 and 3 % crushed Anise. The results indicated that 1, 2 and 3% levels of anise, had different effects on egg quality parameters. So that 2% level treatment showed significantly increase of shape index. Shell thickness in treatment diet with level of 1 and 2% anise, increased, and 3% level treatment had not significantly different compared to control group. 3% level treatment significantly reduced shell weight compared to other treatments. egg shell strength (ESS) in 3% level treatment, were significantly reduction than control group and 1% level treatment. 3% level treatment of anise significantly increased yolk color. In second 4 weeks just yolk color and shell strength were affected. Such that 2% level treatment, significantly increased yolk color, and all of the treatments significantly increased shell strength. The results of this study suggest that crushed Anise could improve some egg quality parameters in laying hens.

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THE BEST PLANTING DENSITY OF *NEPETA POGANOSPERMA*

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Determining the most suitable planting density is important in order to enable plants to take the highest advantages of resources and inputs. Suitable planting density must be selected according to plant factors (e.g. plant size and tillering ability) and environmental factors (e.g. moisture, soil fertility and sun light). So, this experiment was conducted in 2012 at Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, to determine the best planting density of *Nepeta poganosperma*. Experimental design was randomized complete block design with three replications. Treatments included 4, 8, 12 and 24 plants/m². Analysis of variance indicated that planting density significantly affected leaf length, leaf width, inflorescence length and shoot yield in hectare at $P \leq 0.01$, and the number of flowering stems, total number of stems, the number of inflorescences, and single plant yield at $P \leq 0.05$. Mean comparison showed that the highest leaf width (15.3 mm) and leaf length (42.3 mm) were achieved in 8 plants/m². Planting 4 plants/m² gave the highest number of flowering stems (41.22), non-flowering stems (47.03), total number of stems (88.25) and the number of inflorescences (2.57). The highest shoot yield (5185 kg/ha) was achieved in 24 plants/m² and the lowest shoot yield (1454 kg/ha) was achieved in 4 plants/m². Results of this experiment generally indicated that to increase shoot yield in the first year, higher planting density is recommended, but more experiments should be conducted about the following years.



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**EFFECT OF COLD STRATIFICATION, CHEMICAL SCARIFICATION
AND GA₃ ON DORMANCY BREAK IN *SCROPHULARIA STRIATA***

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Scrophularia striata belongs to Scrophulariaceae family and naturally grows in the western regions of Iran. *S. Striata* is one of the strategic and important medical plants that there is not scientific information about dormancy and germination of this plant. Both leaves and seeds of *S. Striata* contain both anti cancer and cell growth enhancing agents. The germination responses of this species to various germination improvement treatments including scarification (using sulphuric acid (H₂SO₄ 98%) for 2, 5, 10, 15min), cold stratification (in 5°C for 1,2,4,8 and 12 weeks), soaking seeds in Gibberellic acid (GA₃) (10, 50, 100, 250, 400ppm) for 24 hours, cold stratification + GA₃ and scarification+ cold stratification were studied. Chemical scarification of seed coat improved seed germination parameters. Moreover, seed germination of *S. striata* affected by other treatments such as moist chilling and chemicals, and proposing that *S. striata* seeds also have endogenous dormancy. Standard germination test showed that germination percentage of untreated seeds is 13% while after soaking seeds in 100 ppm of GA₃ for 24 h reached to 30%. Cold stratification for one week resulted in 63% and germination percentage decreased with increasing in cold stratification durations. The highest value of germination parameters detected by combination of soaking seeds in 400 ppm of GA₃ for 24 hours and moist chilling at 5°C for one week. Total germination percentage (Gt) reached to 92% in this treatment. Results of this study present strong evidence that *S. striata* seeds possess non-deep type of physiological dormancy.

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**STUDDY ON SUSCEPTIBILITY OF *BEMISIA TABACI* (GENN.)
(HEM.:ALEYRODIDAE) TO *CALOTROPIS PROCERA* AND *TEUCRIUM
POLIUM* PLANT EXTRACTS IN CONTROL CONDITIONS.**

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The sweet potato whitefly, *Bemisia tabaci* (Genn.) (Biotype A) (Hem: Aleyrodidae) is a major pest of field crops, vegetables and ornamental plants. Because of limitations and hazards that were produced in nature for use impolitic from toxins, in these days, plant toxins because of to be safe for environmental and easy application in different suitable methods with pests management control, to attract at helmet too much attention [1]. In this research, the effect of plant extracts of *Calotropis procera* and *Teucrium polium* on adults of *Bemisia tabaci* with leaf dip test were studied. Probit analysis of concentration-mortality data was conducted to estimate the LC₅₀ values for each treatment. Each laboratorial unit was consists of two clear plastic glasses (10 cm diameter, 15 cm height). Tomato young leaflets with 2 leaves (Ch variation) were treated by immersing in the tested insecticides for 20s. The treated leaflets were allowed to air dry and then *B. tabaci* adults were released on plants. . Numbers of dead *B. tabaci* adults were recorded for 48 hours post application. The experiments were carried out in a complete randomized design with three repetitions and each repetition consists of fifteen common *B. tabaci* adults. At 27 ±2 c , 60±5 RH and photoperiodism of 16:8 h(L:D). The results showed the calculated LC₅₀ value for *C. procera* and *T. polium* were 39023 and 76861 mg/ml respectively and dosage-response gradient was estimated respectively 1.16±0.22 and 1.579±0.3. At the based on calculated LC₅₀ and dosage-response gradient *C. procera* plant extract on adults showed more toxicity than *T. polium*. Therefore, these plant extracts can to use as safe and effective compounds in control of greenhouse pestes especially *B. tabaci*.



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**EFFECT OF DIFFERENT LEVELS OF CRUSHED BLACK SEED
(*NIGELLA SATIVA*) ON EGG QUALITY PARAMETERS IN LAYING
HENS**

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Recently, published data indicated that indiscriminate use of in-feed antibiotics increases several strains resistance to antibiotics used for human health and enhances transferring the resistance to other bacteria [1]. Nowadays, there are increasing trends to use herbal life style and dietary choices for human welfare and to improve the productivity and health of farm animals. These natural products can help the whole body and improve the immunological status. Ns improve the average daily gain, feed digestibility and nutritive value, have immunostimulant and hepatoprotective effects and improve the reproductive performance and thyroid function in farm animals [2]. The black seed or *Nigella sativa* (*N. sativa*) is a type of plant that belongs to the Ranunculaceae family. It is contains 35-40 % oil, bitter substances, saponins, volatile fats, tannin, nigelon and thymochinon [3]. These compounds are well known for their antibacterial, antifungal, antihelminthic, antineoplastic, antidiabetic, bronchodilator and antispasmodic effects. An experiment was conducted to evaluate the Effect of different levels of crushed black seed on egg quality parameters in laying hens. This experiment was conducted for 10 months, Including 2 weeks adaptation, and 8 weeks sampling. One hundred and forty 27-wk-old commercial Egg laying type Hy-Line (W36) were randomly assigned into 4 treatments with 4 replicates and 8 birds per each. Treatments were a control diet (0.0% crushed black seed) and diets containing 1, 2 and 3 % crushed black seed. The results of the experiment showed that shape index and Haugh unit (HU) between treatments were not significantly affected by the treatments. Yolk color, Shell thickness and shell weight were not affected by the treatments during the first 4 weeks of the experiment. In second 4 weeks, Treatment diet with level of 1% crushed black seed significantly increased shell thickness and weight than control group. shape index, Haugh unit and egg shell strength (ESS) of experimented treatments compared to control group were not significant. Treatment diet with level of 3 % crushed black seed significantly increased yolk color compared to control group. The results of this study suggest that crushed black seed could improve some egg quality parameters in laying hens.

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THE EFFECT OF CORM NUMBER ON SAFFRON YIELD COMPONENTS

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Planting more than one corm in each pit is one of the methods of increasing saffron yield. To study the effect of the number of corms on saffron, this experiment was conducted in the form of a randomized complete block design with three replications. Treatments included 2, 4 and 6 corms in each pit. Results indicated that the number of corms significantly affected stigma yield, petal yield in hectare, flower yield in hectare and leaf length at $P \leq 0.01$, and stigma yield in hectare and single style yield at $P \leq 0.05$. Mean comparison indicated that the highest stigma yield of a single flower (0.007 g/plant) and style yield of a single flower (0.002 g/plant) were achieved when two corms were planted in a pit. The highest stigma yield in hectare (6.706 kg/ha), petal yield in hectare (81.56 g/ha) and complete flower in hectare (100.053 kg/ha) were achieved when six corms were planted in a pit.



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THE STUDY MICROPROPAGATION OF *SATUREIA KHUZISTANICA*

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After seed culture, Nodal segments of derived seedlings *Saturia hortensis* were used as explants and induced on different media, MS (Murashige and Skoog), and B5 (Gamborg et al) with different concentrations and combinations of IBA and BA. B5 medium produced the highest number of shoots (2.7) and tallest shoots (5.3 cm). The highest number of nodes and viable plantlets were observed in B5 mediums. The highest number of shoots (2.55) and number of nodes (3.66), tallest shoots (5.91 cm) and viable plantlets (95.7 %) were obtained at concentration of 1mg/l BA. The tallest shoots (6.4cm) and number of nodes (6.2) were obtained in MS medium with 1mg/l BA. Nodal segments, excised from seedlings, grew successfully in all cytokinins and growth regulator combinations. Quarter salt strength MS basal media induced rich rooting response (85.2%), when compared with 1/2MS (46.6%) and MS (17.6%), mediums. Maximum of roots (12.3) (~ 1.55 cm), were induced in 1/2 MS media. In the free auxin medium (control), rooting was occurred, but the highest rooting percentage (80%) and number of roots (8.4 and 7.7) were obtained at .25 and .50 mg/l IBA, respectively. The micro shoot was successful and a total of 80% survival rate was obtained.



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**THE EFFECT OF PLANTING DENSITY ON SAFFRON MORPHOLOGY
AND YIELD**

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Regarding the medicinal and economical values of saffron, this experiment was conducted to improve its yield by determining the best planting density. Experimental design was randomized complete block design with three replications. Treatments included three planting intervals: 15 × 15 cm, 20 × 20 cm and 25 × 25 cm. Analysis of variance indicated that planting density significantly affected stigma yield of a single flower, petal yield in hectare, flower yield in hectare and the number of leaves of a single corm at $P \leq 0.01$, and style yield in hectare and stamen yield of a single flower at $P \leq 0.05$. Mean comparison indicated that in 25 × 25 cm, stigma yield of a single flower (0.007 g) and stamen yield of a single flower (0.01 g) were the highest. In 15 × 15 cm, style yield in hectare (1989.8 g/ha), petal yield in hectare (91520 g/ha) and flower yield in hectare (109027 g/ha) were the highest. Results indicated that in lower planting intervals, yield components such as stigma and stamen were higher; however, complete flower yield was the best in the highest planting interval (25 × 25 cm). This represents that larger flowers can be obtained when saffron is planted with lower planting density (higher intervals). However, to determine the best planting density, flower quality must be studied in addition to the quantity.



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**EFFECT OF PLANTING TIME AND PLANT DENSITY ON
MORPHOLOGICAL CHARACTERS AND YIELD OF
*ACHILLEA MILLEFOLIUM***

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In order to investigate effect of planting time and plant density on morphological traits and shoot yield of *Achillea millefolium*. This experiment was conducted in 2012 at Alborz research station, Research Institute of Forest and Rangelands, Karaj, Iran. Experimental design was factorial in the form of a randomized complete block design with three replications. Treatments of planting time were at 5 March, 24 March, 13 April and 4 May and densities were 30*30cm, 20*20cm and 15*15cm. Analysis of variance indicated that planting time and plant density affected fresh weight, root long, root width, inflorescence height, stem height, inflorescence dry weight, leaf weight, root weight, stem weight, total dry weight of plant and yield at $P \leq 0.01$. Mean comparison showed that the highest stem height (54.75 cm), fresh weight (139.33g), root long (20 cm), leaf weight (24.37 g), root weight (24.16), stem weight (12.67) and total dry weight of plant (70.15g) were achieved in the 20*20 cm treatment. . Mean comparison showed that the highest stem height (57.77 cm), fresh weight (161.23g), leaf weight (29.28 g), stem weight (15.3), total dry weight of plant (72.24 g) and yield (1.926944 t/ha) were achieved in the second planting time treatment. The highest shoot yield (604.68 kg/ha), leaf yield (429.73 kg/ha) and stem yield (174.94 kg/ha) were achieved in the 24 March treatment.



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**EFFECTS OF DIFFERENT JASMONIC ACID LEVELS ON GROWTH
AND CHEMICAL COMPOSITION OF MARIGOLD SINGLE FLOWER**

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Calendula officinalis Linn. belongs to the Asteraceae (Compositae) family. This plant is a very useful species of medicinal plants with many uses in phyto-therapy and cosmetics. The carotenoid in the marigold's flower have a fundamental constituent of drugs [1]. The aim of this study was to evaluate the effect of foliar application of jasmonic acid on vegetative growth and some chemical constituents such as plant height, flower diameter, number of flowers, fresh weight flower, dry weight flower, carotenoids, chlorophyll a and b of marigold plant. Three concentration of jasmonic acid (0, 75, 150 and 225 μM) were compared in a completely randomized design with 15 replications. The obtained data indicated that number of flower, fresh weight flower and chlorophyll b were significantly ($p \leq 0.05$) increased by foliar application of jasmonic acid as the highest values of number of flower and chlorophyll b were obtained at concentration of 225 and 150 μM respectively. For fresh weight flower, 150 and 225 μM dedicated the maximum value. Flower diameter and plant height was enhanced with high hormone application. Chlorophyll a and carotenoids in leaves of marigold plants were increased as a result of application of jasmonic acid, more so with 150 μM . These results indicate that foliar application of jasmonic acid can enhance growth and chemical constituents of marigold.

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**IMPACT OF FOLIAR APPLICATION OF PUTRESCINE ON GROWTH
AND PHOTOSYNTHETIC PIGMENTS OF MARIGOLD SINGLE
FLOWER**

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Calendula officinalis Linn (Asteraceae) known as Pot Marigold is an important medicinal plant used in our Traditional Systems of Medicine [1]. It has been reported to possess many pharmacological activities, which include antioxidant, anti-inflammatory, antibacterial, antifungal and antiviral [2]. In order to study the effects of different levels of polyamine compounds (Putrescine) on morphological and phytochemical characteristics of marigold single flower, an experiment was conducted as a completely randomized design with 15 replications. Plants were sprayed three times at interval of 20 days with concentrations of 0, 50, 150 and 250 ppm putrescine. Traits including plant height, flower diameter, number of flowers, fresh weight flower, dry weight flower, carotenoids content, chlorophyll a and b content were measured. The results showed that different levels of putrescine have significant effect on number of flower, dry and fresh flower weight. Increasing concentration of putrescine from 50 to 250 ppm caused increased number of flower and plant height. The best results for traits such as flower diameter, fresh weight flower and dry weight flower were found at 150 ppm putrescine. Chemical constituents i.e. Chl. (a), Chl. (b), carotenoids in the leaves have increased in comparison control plants. Highest values of the mentioned characters were obtained from plants treated with Putrescine 50 ppm. Our analysis revealed that exogenous application of putrescine can enhance growth and photosynthetic pigments of marigold.

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**STRUCTURE ELUCIDATION OF MARINE ALGA *SARGASSUM*
ANGUSTIFOLIUM COLLECTED FROM THE PERSIAN GULF
COASTAL WATERS OF BUSHEHR**

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Several species of *Sargassum* are found in the Persian Gulf and Oman Sea coastal waters, such as *Sargassum angustifolium* [1]. *Sargassum* like other multicellular plants have some chlorophyll. If the magnesium ion does not exist in the structure of chlorophyll, it is called pheophytin. In plants, pheophytins are precursors of the chlorophylls production. When PC12 cells were treated with a low concentration of pheophytina (3.9 mg/ml) in the presence of a low level of nerve growth factor (10 ng/ml), the compound produced neurite outgrowth similar to that produced by a high level of nerve growth factor (50 ng/ml). Pheophytina also enhanced signal transduction in the mitogen-activated protein kinase signaling pathway, which is also induced by nerve growth factor [2]. For the first time, we identified and characterized neurodifferentiation compounds from the marine brown alga *Sargassum angustifolium*, collected from coastal waters of Bushehr. Several instrumental analyses revealed that the compounds were corresponding to pheophytina and one more other pheophytin derivative.

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**THE EFFECT OF DIFFERENT N FERTILIZERS AND WEED
MANAGEMENT ON BASIL YIELD, OIL PERCENT, OIL YIELD
AND LINALOL PERCENT OF BASIL IN BERSEEM CLOVER AND
BASIL INTERCROPPING SYSTEM**

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Sweet basil (*Ocimum basilicum*) an annual, herbaceous and odorant plant belongs to Labiatea family with long background as a vegetable and medicinal plant. Nowadays, due to public concern about antibiotic resistance of human pathogens and banning the use of antibiotics as growth promoters, worldwide use of medicinal plants was increased. To study the effect of different Nitrogen fertilizer on oil percent, oil yield and oil component of basil in berseem clover and basil intercropping system, this experiment was conducted in Research Farm of College of Agriculture, University of Tehran in 2011. Experimental treatments were arranged as split plots based on a randomized complete block design with three replications. Different N fertilizers consisted of control (no N fertilizer), 100% chemical fertilizer, biological fertilizer, and integrated fertilizer (biological fertilizer + 50% N fertilizer) were assigned to the main plots while basil mono cropping weed free and with weed, basil mono cropping (weed contaminated), were assigned to the sub plots. The studied traits were basil dry yield, oil percent, oil yield (kg/ha), Linalol percentage of basil. The results showed that the highest basil forage yield (in two harvests) (4701 kg/ha) was obtained from basil mono cropping (weed free) treatment when received integrated fertilizer. The highest oil yield (in two harvests) (12.85 kg/ha) in integrated fertilizer and the lowest was obtained from control treatment. Type of nitrogen and weed management was significant on oil percentage. (Respectively on $P \leq 0.01$ and $P \leq 0.05$). The integrated fertilizer was achieved highest oil percentage (0.7900 %). Weed control had the highest oil percentage (0.74 %). The highest Linalol percentage (41.33%) was obtained from integrated fertilizer. Our results suggest that integrated fertilizer could be considered as the best nitrogen fertilizer to substitute for chemical fertilizer in additive intercropping of berseem clover and basil and weeding can be improve the quantity and quality of basil oil.



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**HEPATOPROTECTIVE EFFECT OF METHANOLIC EXTRACT
BERBERIS INTEGERRIMA ROOT ON CARBON TETRACHLORIDE-
INDUCED ACUTE HEPATOTOXICITY IN RATS**

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Barberry root extract contains various alkaloids that are considered as antioxidants [1]. Beneficial effect of methanolic extract of *Berberis Integerrima* root (AEBIR) was evaluated for liver function on carbon tetrachloride-induced acute hepatotoxicity in rats. Hepatotoxicity was induced by i.p injection of CCL₄ with 50% in olive oil twice a week for 4 weeks to rats [2]. Experimental rats were randomly grouped and treated daily with AEBIR and silymarin by gavage for 28 days [3]. Some biochemical parameters of serum and histological analyses of the liver *organs* were performed at the end of the study. CCL₄ induced a significant rise in aspartate amino transferase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP), lactate dehydrogenase (LDH) and total bilirubin. Treatment of rats with different doses of *Berberis Integerrima* root extract (250 and 500 mg/kg) and silymarin significantly altered all parameters levels to near normal after 4 weeks compared to untreated hepatotoxicity rats. The activity of the extract at dose of 500 mg/kg in all parameters was more than the standard drug, silymarin. Histopathological changes of liver sample were compared with respective control. Methanolic extract of *Berberis Integerrima* root improves liver dysfunction in

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**EVALUATION OF ANTIOXIDANT ACTIVITY AND PHENOLIC
COMPOUND OF GAVAN-E-GAZ-ANGUBINI
(*ASTRAGALUS ADSCENDENS*)**

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Traditional herbal medicine plays an important part in Iranian healthcare system. Gavan-e-Gaz-angubini (*Astragalus adscendens*) has been used in traditional medicine and its antioxidant effects have not been studied previously. The aim of this study, the evaluation of antioxidant activity properties, total flavonoid and polyphenol compounds of methanolic extract from different parts including stem, manna, leaf, flower and combination of leaf and flower (mixed sample) of Gavan-e-Gaz-angubini. DPPH assays were used for the antioxidant activity. The results of DPPH assays were expressed as IC₅₀. Total phenolic contents were determined using a spectrophotometric technique. The results showed that, the highest and lowest of IC₅₀ was in stem and mixed sample respectively (7680.87 and 5475.75 mg/ml). Also the maximum and minimum content of total flavonoid were observed on flower and manna samples respectively (425.90 and 152.97 mg Quercetin/ g DW). On the other hand, the highest polyphenol content (137.28 mg Gallic Acid/ g DW) reached in flower sample and the lowest content (42.70 mg Gallic Acid/ g DW) related to stem treatment. Totally, the results showed these biochemical factors were differing between various organs [1, 2].

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**THE EFFECT OF METHYL JASMONATE ON SOME IONIC AND
PIGMENT CONTENT IN THYMUS DAENESIS GROWN UNDER
SALINITY**

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Thymus daenesis, is an important medicinal plant in worldwide with an important secondary metabolites' such as thymol and carvacrol (1). Salinity is one of the important abiotic stress that limits plant's growth and impairs agricultural productivity. Using plants' growth regulators, is a way to increase the plants' tolerance against stress (2). The aim of this study is the effect of methyl jasmonate against salt stress in *Thymus daenesis*. This experiment was carried out in complete randomized design in 3 replications. Plants were pretreated with different levels of MeJa (0, 0.1, 0.01 μ M) 3 times and then treated with NaCl (0, 60 mM). *Thymus*'s Mn, Mg and photosynthetic pigments content was measured. Results showed that chlorophyll a, chlorophyll b, total chlorophyll and carotenoid content was increased significantly in plants that treated with MeJa and NaCl. Mg content was decreased in the root and there is no change in the Mg content in plants' shoot. Treatments had no effect on Mn content. Based on these results; MeJa had meaningful effect on amelioration injury of *Thymus*'s photosynthetic function grown under salinity.

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**EFFECT OF DROUGHT STRESS ON PEROXIDASE AND
CHLOROPHYLL CONTENTS IN
HIBISCUS SABDARIFFA LINN.**

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Hibiscus sabdariffa (Malvaceae) is grown for nutritional, medicinal, and industrial purposes. The dried calyces contain the flavonoids - gossypetin, sabdaretin, hibiscetin and anthocyanins. Flavonoids are phenolic substances that act in plants as antioxidants. Antioxidant vitamins such as vitamins C and E along with flavonoids have been shown to be effective in reducing atherosclerosis along with many other diseases. This study was carried out to investigate Antioxidant and chlorophyll contents in *Hibiscus sabdariffa* Linn under different irrigation regime (*viz*; control (no stress was imposed, 75, 50 and 25% Field capacity) in a complete randomized design with three replications. Drought stress imposed during vegetative growth significantly decreased leaf peroxidase. Maximum decrease was observed in 25% FC irrigation ($0.072 \Delta A g^{-1}FW$) in comparison with control ($0.253 \Delta A g^{-1}FW$). Unlike leaf, the peroxidase content significantly increased in calyx and maximum content of that was seen in 50% FC ($0.351 \Delta A g^{-1}FW$). Also, the results showed that chlorophyll content made difference between four treatments. In 75% FC, the content of chlorophyll a and b increase which with using of more photosynthesis and better food processor can tolerate dry conditions, but mild decreases in 50 and 25% FC and then remained unchanged. However, total chlorophyll level was unchanged during drought stress.

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**THE EFFECT OF DIFFERENT VERMICOMPOST CONCENTRATION
ON BIOCHEMICAL CHARACTERISTICS OF THE SAVORY
(*SATUREJA HORTENSIS* L.) CULTIVARS**

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In order to, study the effect of different concentration of vermicompost on morphological and biochemical traits of *Satureja hortensis* L., the pot experience was conducted on factorial (include two factors) based on randomized complete block design (RCBD) with 10 treatments and 4 replications in controlled conditions. The first factor, vermicompost concentration includes 5 levels: 20, 40, 60, and 80% vermicompost and control (common soil without vermicompost) and the second factor, two savory cultivars include local and improved (Saturn) cultivar. At the end of experiment, at full flowering stage, some biochemical factors including total flavonoid, flavone and flavonol, polyphenol content and antioxidant activity were measured. The results showed significant effect on most measured factors. As relation to flavonoid, flavone and flavonol and polyphenol content until 40% vermicompost increased while higher level of vermicompost decreased these biochemical factors, so that the lowest content related to 80% vermicompost treatment. Also, the highest antioxidant activity (minimum EC₅₀) belonging to 40% vermicompost treatment and other treatments were placed on similar group, statically. In totally, application of 40% vermicompost fertilizer for *Satureja hortensis* recommends.

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**EFFECTS OF SALINITY AND WATER STRESS ON GERMINATION
CHARACTERISTICS OF HYSSOP
(*HYSSOPUS OFFICINALIS* L.)**

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Regarding the importance of studying the reactions of *Hyssopus officinalis* to salinity and drought stresses, and also finding the cardinal temperatures, a test in a completely randomized design (CRD) has been carried out in 40 replications. After finding the desired temperature, the treatments of salinity and water stresses were applied using different osmotic potentials of NaCl and CaCl₂; and PEG6000 at different levels (0, 0.3, 0.5, 0.7, 0.9 and 1.1 Mega Pascal) respectively. In all experiments, the indexes of the percentage and the speed of germination, the length of root and shoot, the ratio of root: shoot weight, and the root and shoot dry weight was measured. Analysis of variance was done by SAS statistical software and the average of the data was compared using Duncan test. The results showed that all temperature treatments of had significant effects on the above-mentioned indexes. The results of the analysis of variance showed that the effects of different osmotic potential on all the investigated factors was significant ($\alpha = \%5$). In addition, the results showed that the percentage and the speed of the seeds germination had a significant reduction ($\alpha = \%5$) following the reduction of different salinity and water potentials. However, the different levels of NaCl, due to the poisonous effects of Sodium ions, had more negative effects on the parameters of germination in most cases, in comparison with CaCl₂.

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**INVESTIGATION THE EFFECTS OF PLANT GROWTH PROMOTING
RHIZOBACTERIA (PGPR) ON THE AMOUNT OF ESSENTIAL OIL OF
MEDICINAL PLANT OF TARRAGON**

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Plant growth promoting rhizobacteria represent a wide variety of soil bacteria which used as a biofertilizer, when grown in association with a host plant result in stimulation of plant growth. Tarragon is a vegetables, which has great impotance with respect to medicinal and nutritional value. In order to investigate the effects of Plant growth promoting Rhizobacteria (PGPR) inoculation on the percent and yield of essential oil of Tarragon an factorial pot experiment based on completely randomized design with three replication were conducted in research field of horticulture department of Mohaghegh Ardebili University 2010- 2011. Experimental treatments include inoculation with three species of rhizobacteria namely Azotobacter, Azospirillum, Pseudomonas suspension in single and its combination application and control (without inoculation with bacteriy), which applied as rhizome inoculation and folier spraying. Tarragon dry leaves were seperated after harvesting, then sample with 20g weight were prepared. The essential oils of samples were extracted by Kelevenjer device for 2 hours via hydro-distillation method. Results revealed that the all of bacteria treatments were caused the significant increasing of percent and essential oil yield and biological yield of essential oil in the ($P < 0.01$) than control and this increasing were more in combination treatments. The highest and lowest amount for essential oil percentage 20.58 and 11.32 were obtained from foliar spraying of Azotobacter-Azosperillum and rhizome inoculation of three Rhizobacteria respectively. The maximum value for essential oil yield 411.5 cc/m² was derived from foliar spraying of Azotobacter – Azosperillum while the minimum yield of essential oils 226.5 cc/m² was extracted from rhizome inoculation of three Rhizobacteria. In general results of this investigation indicated that inoculation with plant growth promoting Rhizobacteria leds to increases in essential oil indices of tarragon plants by supplying better condition for water and nutritional elements absorption from soils.

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MORPHOLOGICAL TRAITS REACTION AND NPK UPTAKE OF TWO SAVORY OF (*SATUREJA HORTENSIS* L.) CULTIVARS TO DIFFERENT VERMICOMPOST CONCENTRATION

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In this research, the effect of different amount of vermicompost on morphological and traits and npk absorbance of two *Satureja hortensis* L., were studied. The pot experience was conducted on factorial (include two factors) based on randomized complete block design (RCBD) with 10 treatments and 4 replications in controlled conditions. The first factor, vermicompost concentration includes 5 levels: 20, 40, 60, and 80% vermicompost and control (common soil without vermicompost) and the second factor, two savory cultivars include local and improved (Saturn) cultivar. At the end of experiment, at full flowering stage, plant height, lateral shoot number, lateral shoot length, leaf number, fresh and dry weight of shoot and npk absorbance were determined. The results showed significant effect on some measured factors. In most cases relation to yield indexes, the highest content belongs to 80% vermicompost and the lowest amount was observed to control treatment. In totally, application of 40% vermicompost fertilizer for *Satureja hortensis* recommends.

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**ANTIDEPRESSANT-LIKE POTENTIAL OF ETHANOLIC EXTRACT
OF *APIUM GRAVEOLENS* L. IN THE FORCED SWIM TEST AND TAIL
SUSPENSION TEST IN MICE**

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The aim of this study was to evaluate the antidepressant effects of *Apium graveolens* L. ethanolic extract in the forced swim test (FST) and tail suspension test (TST) in male mice. In this experimental study, 32 male NMRI were divided into 4 groups: Control (Normal saline, 10ml/kg and ethanolic extract treatment groups (300, 400 and 500 mg/kg, i.p). In the FST mice individually placed inside a cylinder filled with water and immobility time of the animal is measured (during 6 min). Traditionally, 'floating behavior' (the animal remains almost immobile and with its head above water) is used as a parameter to analyze 'hopelessness' and thus depression-like behavior. In TST, Each mouse was suspended by its tail with adhesive tape for 6 min [1, 2]. Our results showed that all doses of ethanolic extract in FST (122.23 ± 14.65 , 110.22 ± 11.88 and 67.88 ± 6.51 ; $P < 0.001$) and TST (126.56 ± 10.32 , 106.38 ± 6.89 and 76.86 ± 9.81 ; $P < 0.001$) compared to control groups (216.18 ± 4.45 and 203.98 ± 5.67 , respectively) significantly and dose- dependently reduced the duration of immobility time. In conclusion, it could be suggested that *Apium graveolens* L. antidepressant effect may be due to the content of flavonoids (e.g. quercetin) [3, 4]. However further research is required to gain closer insights into the exact mechanism of its action.

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**INVESTIGATION THE EFFECTS OF BIOFERTILIZERS ON THE
MORFOLOGICAL TRAITS OF MEDICINAL PLANT OF TARRAGON**

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In order to investigate the effects of Plant growth promoting Rhizobacteria (PGPR) inoculation on the morphological traits of Tarragon a factorial pot experiment based on completely randomized design with four replications were conducted in Research field of Horticulture Department of Mohagheh Ardabili University at 2010 - 2011. Experimental treatments include inoculation with three species of rhizobacteria namely Azotobacter, Azosperillum, Pseudomonas suspension in single and combination application and control (without inoculation with bacteria), which applied as rhizome inoculation and foliar spraying. Results revealed that inoculation of tarragon plants with PGPR had significant effect on growth parameters. The highest value for traits such as the number of stem branches (76.75) and rhizome(31.75) were obtained by foliar application of Azosperillum–Pseudomonas and The lowest amount its 36 and 8.25 respectively and was derived from control. Rhizome inoculation of Azotobacter - Azosperillum combination caused increases in plant height 38.75 (cm) and rhizome dry weight 247.5 (gr) in comparison to control. In general results of this investigation indicated that inoculation with plant growth promoting Rhizobacteria leads to increases in growth indices of tarragon plants by enhancing root growth and development by supplying favorable condition for plant growth with respect to supplying better condition for water and nutritional elements absorption from soils.

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**PTLC ISOLATION OF MARINE ALGA SARGASSUM
ANGUSTIFOLIUM COLLECTED FROM THE PERSIAN GULF
COASTAL WATERS OF BUSHEHR**

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Algae are a large group of plants that show a wide variety of shapes and sizes. *Sargassum* is a kind of the brown algae family. *Sargassum* belongs to Fucales category and Sargassaeae order. Several species of *Sargassum* are found in the Persian Gulf and Oman Sea coasts, such as *Sargassum angustifolium* [1]. The thin-layer chromatography (TLC) is a kind of solid-liquid adsorption chromatography and its principle is the same as column chromatography, but in this case the solid adsorbent (Silica gel) packs on the piece of glass or hard plastic to form a thin layer. A drop of sample solution is put on the near edge of the screen and it is placed in a tank with adequate extractor solvent. The chromatography in tank is ascendant. Separation occurs because it is based on solubility difference between substances in the sample and solvent. The rapid and high sensitivity are two advantages of this method. Preparative Thin-layer chromatography (PTLC) is like TLC but use in high weigh scales to several hundred milligrams of unknown compounds. The material is separated on screen singly are taken away and separated from adsorbent [2]. In this research Alga *Sargassum angustifolium* collected from the Persian Gulf coast of Bushehr were dried away from sunlight on glass screen. Maceration method was employed to extract 2400 grams of dried alga powder. Due to initial separation of ethyl acetate extract by using column chromatography of 60 separated extracts, 10 grams n-hexane and 17 grams of unprepared ethyl acetate extract were produced. Final extraction was carried out by PTLC. As a result of separation, 6 pure compounds, weighing 15-20 milligrams were produced, and were sent for spectral identification.

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**EFFECT OF DIFFERENT PHENOLOGICAL STAGES ON THE
ESSENTIAL OIL CONTENT AND CHEMICAL COMPOSITIONS OF
TANCY (*TANACETUM VULGARE L.*)**

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Tansy (*Tanacetum vulgare L.*) is a perennial, herbaceous, and aromatic plant from Asteraceae family. This investigation was conducted to study the effect of different harvest stages (i.e. rosette, stem initiation, floral budding, full flowering and beginning of fruit set stages) on the essential oil (EO) content and chemical compositions of Tansy (*Tanacetum vulgare L.*). The EO samples were extracted by hydrodistillation and analyzed by GC and GC-MS instrument. EOs contents at the rosette, stem initiation, floral budding, full flowering and beginning of fruit set stages were 0.52, 0.55, 0.53, 0.91 and 0.73% based on dry weight, respectively. A total of 37, 33, 35, 37, 34 compounds were identified and quantified in the oils of the above mentioned stages, respectively. The major EO compounds were trans-Thujone (9.9- 44%), camphor (8.5- 31%) and trans-Chrysanthenyl acetate (13.5- 31.1%). It has been previously reported that harvest stage significantly affect EO content and compositions of some species such as *Satureia hortensis* [1] and *Nepeta cataria* [2].

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**EFFECTS OF CADMIUM AND LEAD ON SEED GERMINATION AND
EARLY SEEDLING GROWTH OF FENUGREEK
(*TRIGONELLA FOENUM GRAECUM* L.)**

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In two separate experiments, the seeds of fenugreek (*Trigonella foenum graecum* L. cv. 'shooshtar') were germinated in different concentrations of (25, 50, 100, 200, 400 and 800 μ M) of cadmium sulphate [$\text{CdSO}_4 \cdot \text{H}_2\text{O}$] or lead(II) acetate [$\text{Pb}(\text{CH}_3\text{COO})_2$] and it was compared with the control seeds irrigated with distilled water. Percentage germination, seedling growth parameters including: root and shoot length, root and shoot dry weight, seedling vigor index [germination (%) \times (shoot + length in cm)] and root/shoot dry weight ratio at 17°C after 14 days were measured. The design of the each experiment was completely randomized design with four replication (each replication containing 50 seeds). Results of first experiment showed that the growth parameters like root length and dry weight, length and dry weight of seedlings, seedling vigor index and root/shoot dry weight ratio showed a decreasing trend with increase in lead acetate concentration. Germination percentage, shoot length and dry weight were not affected by lead acetate treatments. Results of second experiment showed that the seed germination was not significantly affected by cadmium sulphate. Also, the results showed a decrease in seedling vigor index, shoot and root lengths, shoot and root dry weight and root/shoot dry weight ratio in response to cadmium sulphate treatments, and this effect became more significant at higher metal concentrations. The reduction in the growth of fenugreek seedlings were observed after seed treatment with lead acetate or cadmium sulphate and roots showed higher degree of growth inhibition compared to shoots. The observed cadmium or lead-induced decrease in growth of fenugreek (*Trigonella foenum graecum* L.) seedling may be explained on the basis of heavy metals interference with cell division and cell enlargement, especially in roots.



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THE EFFECT OF PH ON SEED GERMINATION OF *RUTA GRAVEOLENS L.*

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The Common Rue (*Ruta graveolens*), also known as Herb-of-Grace, is a species of rue grown as a herb. It is native to the Balkan Peninsula, southeastern Europe. It is sometimes grown as an ornamental plant in gardens, especially because of its bluish leaves, and also sometimes for its tolerance of hot and dry soil conditions. It also is cultivated as both a medicinal herb, as a condiment, and to a lesser extent as an insect repellent. The aim of this study was to investigate the effect of pH at the levels of 0, 4, 6, 8, 10 and 12 (bar) on germination of *R. graveolens L.* seeds. The experiment was conducted in Petri-dishes using a completely randomized design with three replications. Results showed that the pH had a great influence on the germination percentage and rate and length of coleoptile and radicle root, ratio r/s and wet weights of radicle and plumule of *R. graveolens L.* seeds and the best germination response was observed in seeds irrigated with control. Increasing drought level, led to higher plumule length reduction compared to radicle length reduction.



**HIGH SCOLICIDAL EFFECT OF AJOWAN
(*TRACHYSPERMUM AMMI*) ESSENTIAL OIL ON PROTOSCOLICES
OF HYDATID CYST**

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Various chemical scolicidal agents have been used for inactivation of hydatid cyst protoscolices, but most of them are associated with adverse side effects. Since ajowan (*Trachyspermum ammi*) has been shown to have a number of medicinal properties, in this study the scolicidal effect of the essential oil (EO) from the fruits of this herbal plant was investigated. Ajowan EO was obtained by hydrodistillation method. Gas chromatography (GC) and gas chromatography–mass spectrometry (GC–MS) were employed to determine the chemical composition of the EO. Protoscoleces were exposed to various concentrations of EO (3, 5 and 10 mg/mL) for 10, 20, 30, and 60 min. Viability of protoscolices was confirmed by 0.1% eosin staining. A total of 18 compounds representing 99.54% of the total oil, were identified. Thymol (50.07%), γ -terpinene (23.92%), and p-cymene (22.9%) were found to be the major EO constituents. While the mortality rate of protoscolices in the control group was 6.67%, scolicidal power of ajowan EO at concentration of 3 mg/mL was 31.34, 35.98, 45.17, and 51.58% after 10, 20, 30, and 60 min, respectively. The EO at concentration of 5 mg/mL killed 51.89, 72.20, 88.64, and 100% of protoscolices after 10, 20, 30, and 60 min, respectively. One hundred percent scolicidal activity was observed with ajowan EO at concentration of 10 mg/mL after 10 min of exposure. The results of this study revealed that the EO of ajowan is rich in thymol, γ -terpinene and p-cymene, has high scolicidal power and it may be used as a natural scolicidal agent [1].

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**THE PROTECTIVE EFFECT OF HENNA AND METHYLGREEM ON
THE BACILLUS THURINGIENSIS AGAINST UV FOR CONTROL
*PIERIS BRASSICAE***

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The large white, *Pieris brassicae* L. (Lep: Pieridae), is a pest with extended range of host plants. Biological insecticide, *Bacillus thuringiensis* kurstaki (Btk), is one of the most important biological control agents. The main factors which affect on the disable performance of BT are ultraviolet (UV), temperature and rainfall washing. This research was accomplished to determine protective effect of Hena and Methylgreen on BT efficiency against UV. With this intention, three rows cabbage, in each row four bush, was planted in field. Combination of B.T (strain ABTS-351 at recommended concentration in all treatments) + henna (1%) and combination of B.T + methylgreen (1%) was sprayed on first row's bush and second row's bush, respectively. The control was sprayed with sterile distilled water, experiment was repeated 3 times. Mortality was recorded 1-4 day after sprayed. Data was analyzed by SPSS program. According to the result, the percentage of mortality on 1-2-3 and 4 day was 35, 65.3, 71, 26.6% and 28, 50.7, 60, 15% for Henna and methylgreen, respectively, while it was 25.5, 45, 33.2 and 13% in control. On the other hand, Hana had significantly more protective effect than the methyl green.

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**THE EFFECT OF VERMIWASH FOLIAR APPLICATION AND EM1
BAIKAL FERTILIZER ON MORPHOLOGICAL CHARACTERISTICS
AND ESSENTIAL OIL CONTENT OF *SATUREJA HORTENSIS* L.**

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In this research, in order to, study the effect of vermiwash foliar application and EM1 Baikal organic fertilizer on morphological characteristics and essential oil content of *Satureja hortensis*, the pot experience was conducted on factorial randomized complete design (RCD) with two factors and 12 treatments and 5 replications. The first factor includes 3 concentration of Baikal fertilizer (0, 1 and 2 mg per 1000cc) with irrigation and second factor include 4 vermiwash levels (0, 20, 40 and 60%) as foliar application. At the end of experiment, at full flowering stage, plant height, lateral shoot number, plant fresh weight and dry weight, root fresh weight and dry weight, leaf number and essential oil percentage were determined. The results showed significant effect on some measured factors. The highest plant height (35.1 cm) was belonged to Baikal 2mg/L+ vermiwash 60% treatment while the lowest amount (28.3 cm) attained to Baikal 0mg/L+ vermiwash 40% and control (0+0). The highest dry weight (9.8 g) relation to Baikal 2mg/L+ vermiwash 40 and 60% treatments and minimum content (5.3 g) relation to Baikal 0mg/L+ vermiwash 40%. The highest essential oil content (2.3%) obtained at Baikal 2mg/L+ vermiwash 0% while the lowest content observed at vermiwash 0% +Baikal 0 and 1mg/L.

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**OPTIMUM GROWTH CONDITION FOR FATTY ACIDS-RICH
MICROALGAE *ISOCHRYSIS SP.***

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Isochrysis, a marine prymnesiophyte microalga, is able to produce a high level of long chain polyunsaturated fatty acids (PUFA). PUFA of n-3 and n-6 formations cannot be synthesized by human but can be obtain from the food. Some microalgae such as isochrysis and Pavlova contains eicosapentaenoic acid (EPA; C20: 5n-3) and docosahexaenoic acid (DHA, C22: 6n-3). EPA and DHA are important components of neuronal cells in brain and retina tissues may prevent and reduce cardiovascular disease, carcinogenesis and allergies [1]. The present study were examined the effect of light, salinity and primary media PH to obtain optimum conditions for Isochrysis sp. culture. The result showed that intense light could produce higher growth rate in Isochrysis sp.

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THE EFFECTS OF DIFFERENT DRYING METHODS ON ESSENTIAL OIL CONTENT AND COMPOSITION OF ON QUANTITY AND QUALITY OF ESSENTIAL OILS OF THREE GENOTYPES OF *LIPPIA CITRIODORA* IN MAZANDARAN

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Lippia citriodora, commonly known as Verbena and Lemon plant belonging to the family Verbenaceae, is an important cultivated aromatic plant [1, 2]. This plant has been cultivated in Iran from several years ago. According to High relative humidity, one the most important problem In Mazandaran is the conservation the Quality of medicinal plant. The correct method of drying and Keeping after harvesting are the main factor .In this investigation, the effect of different drying methods (Shadow 20°C, oven 50°C and During warm weather 30°C) on quantity and quality of essential oils of *Lippia citriodora* that cultivated in Center of Medicinal Plants, Academic Center Education Culture Research, Mazandaran, Iran. The experimental design was randomized complete. The oils of all samples were obtained by hydro-distillation and analyzed by GC and GC/MS. twenty-nine compounds in the essential oil of lemon plants were identified [3].The results showed no significant difference between the constituents of the essential oil composition in different methods of drying and differed significantly was in the amount of each compound. Comparison of oil content of dried samples showed drying in during warm weather (pilot drying treatment 30°C) was better and produce higher percentage of oil and aromatic compounds (3.127%). In this research Geranial, Spathulenol and Neral had the highest value in all of drying methods. Eugenol is a Phenylpropene compound in essential oil extraction of lemon plant that it is important for relaxation effects. Eugenol just has been in Pilot method with 0.35 %. Limonene, a Monoterpenoid compound, Anti-Cancer, Anti-Alzheimer and aromatic had 0.49% in all of drying methods.

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**INFLUENCES OF DROUGHT STRESS ON SEED GERMINATION
PARAMETERS IN (*RUTA GRAVEOLENS L.*).**

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In order to study competition and find the influence of drought stress on germination parameters (rate and percentage) for *Ruta graveolens L.* an experiment was performed randomized complete block design with 3 replications. The experiment treatments were included of drought levels (0, -2, -4, -6, -8 and -10 bar). The results showed that drought stress showed significant effects on germination and seedling growth of *R. graveolens*. The seeds were able to germinate in -10 bar matric potential condition. The effect of stress on rate and germination percentage, root and shoot length seedling were significant and with increasing drought stresses, rate and germination percentage, length of radicle and plumule decreased. Increasing drought level, led to higher plumule length reduction compared to radicle length reduction, which shows that *R. graveolens L.* plumule is more sensitive to droughtness than radicle. rate and germination percentage of seedling at -6 bar was 93% and 78% of control plants, length of radicle and plumule decreased 90% and 100% compared to control treatment.



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**THE EFFECT OF ALTITUDE AND HARVESTING TIME ON
CHLOROPHYLL CONTENT AND ESSENTIAL OIL OF *SALVIA
MACROSIPHON* BOISS.**

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Salvia macrosiphon Boiss. is one of the *Salvia* species growing wild in Iran. The essential oil of this plant use as a folk medicine. Growth and development of plants in different ecosystems is effected by different environmental factors like altitude. To investigate the effect of harvesting times and altitude on chlorophyll and essential oil content of *Salvia macrosiphon* Boiss an experiment was conducted as factorial based on randomized complete block design with three replications at Sari agricultural sciences and natural resources university in 2011. The treatments include two places (sari and Kiasar with 15, 1100 meters of sea level, respectively) and two harvesting time (100, 125 days later than cultivation). Results indicated that there was negative correlation between percent of essential oil and altitude. Essential oil content increased at secondary harvesting time, while chlorophyll content was decreased. Maximum of essential oil content (0.2%) was obtained at 15 m altitude (Sari) and secondary harvesting time.

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ESSENTIAL OIL COMPOSITION OF FLOWER OF *CITRUS AURANTIUM* AND ITS EFFECT ON MICROBIAL PROPERTIES OF GOAT MILK

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The aromatic plants are rich in essential oils characterized by a notable antimicrobial activity. For this reason, these substances can be used to delay or inhibit the growth of pathogenic or spoilage microorganisms. The constituents of essential oils isolated by hydrodistillation of the flower of *Citrus aurantium* were examined by GC-MS. A total of 27 components were identified accounting for 88.1% of the total area percent from the chromatogram. Major components of the oil were included limonene (60.0%), linalool (5.1%), (z-beta) ocimene (4.6%), thymol (3.9%), trans-caryophyllene (2.3%) and myrcene (1.3%). The essential oil was added to goat milk at concentration of 0.25 ml/lit. Subsequently, the microbiological properties of freshly prepared flavoured goat milk and of the milk stored at $5 \pm 1^\circ\text{C}$ for 7 days were determined. Results showed that the addition of essential oils significantly affected the total count of bacteria in goat milk during the storage. It was demonstrated that this essential oil had the highest inhibitory effect on the total viable counts and its reduction rate at the end of the storage period.

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COMPARISON OF *ARTEMISIA ANNUA* ESSENTIAL OIL QUALITY ON
THREE HABITATS IN EAST OF MAZANDARAN

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Artemisia annua is an annual plant belongs to *Asteraceae* family that has been used by Chinese herbalists for more than two thousand years in the treatment of many illnesses, such as skin diseases and malaria. *A. annua* is an essential oil bearing medicinal plant that its essence has these medical effects. For production purposes, plants with high quality essence content are required. We want to find the best habitats of *A. annua* plants in in east of Mazandaran for this purpose. Samples of leaves, buds, flowers, or post-bloom flowers and fruits were taken at three habitats. These samples were dried in fresh air under shadow conditions. The essential oil was obtained by water distillation method (Clevenger) then was analyzed by using GC and GC-MS. The main components of the oil in all habitats were α -pinene, 3-Cyclohexen-1-ol, 2-Cyclohexen-1-ol, Trans-Caryophyllene, Naphthalene, and α -Cubebene. β - pinene, α -Terpinene, 1,8-Cineole, Ethanone, 1-(methylphenyl), 1-Cyclohexene-1-carboxaldehyde, Phenol, 2-methyl-5-(1-methylethyl) and 2-Cyclopenten-1-one were found in three habitats. Cyclobuta [1-4] dicyclopentene, 3-Cyclohexen-1-methanol, α -Caryophyllene, Caryophyllene oxide, Caryophyllene, and Tetratriacontane were identified in two habitats. 1, 8-Cineole, α -terpinolene, Isophytol Hexadecanoic acid, Heptadecane and 3-Eicasane were identified only in one habitat. The essential oil of samples that collected from Sari by concluded over 62 components has the best quality and quantity of essences.

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**COMPUTATIONAL ANALYSIS OF 2-PHENYLETHANOL (2PE)
BIOSYNTHESIS PATHWAY IN DAMASK ROSE**

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2-Phenylethanol (2PE) is a prominent scent compound released from flowers of Damask rose (*Rosa damascena*). 2PE is biosynthesized from l-phenylalanine (l- Phe) via the intermediate phenyl acetaldehyde (PAld) by two key enzymes, aromatic amino acid decarboxylase (AADC) and phenyl acetaldehyde reductase (PAR). In the field of protein analysis and engineering, many such websites are useful for design and analysis. These resources are designed to serve as starting points for laboratory and computational experiments. Since there is not much experimental data available about different structural properties of AADC and PAR proteins, in the present investigation, we studied different features of first, secondary and tertiary structure of these proteins by bioinformatics tools in Damask rose. The features achieved in this study may also provide useful clues for designing scent production pathways.

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**STUDY OF PRE-TREATMENTS ON SEED GERMINATION OF
SECURIGERA SECURIDACA L., *SALVIA SCLAREA L.*, *SOPONARIA
OFFICINALIS L.* AND *MALVA SYLVESTIS L.***

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In this investigation, the effects of pre-treatments on seed germination of *Securigera securidaca* (L.), *Salvia sclarea* (L.), *Soponaria officinalis* and *Malva sylvestis* (L.). were conducted an experiment was conducted at physiology laboratory, Agricultural college of Ferdowsi University of Mashhad. Seeds of species were collected from their main habitates and tested for pre-treatments as sulfuric acid (2, 4, 6, 8 and 10 minutes) and control sample (0). Seeds were sown in Petridishes for 14 days. This experiment was complete randomized design with three replications. According to the results, applying sulfuric acid for 8 and 10 minutes as pre-treatment on *Securigera securidaca* (L.), 10 minutes as pre-treatment on *Salvia sclarea* (L.), 2 minutes as pre-treatment on *Soponaria officinalis*, 2 and 4 minutes as pre-treatment on *Malva sylvestis* (L.) had higher values of seed germination percent Respectively 68%, 64%, 73% and 40% Compared to control. And also increased germination rate in the pretreatment.



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**THE PROTECTIVE EFFECT OF METHANOLIC EXTRACT OF
BERBERIS INTEGERRIMA ROOT ON KIDNEY DAMAGE IN CARBON
TETRACHLORIDE – INDUCED NEPHROTOXICITY IN RATS**

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The alkaloids existent in barberry root are considered as antioxidants [1]. We decided to assess the effect of methanolic extract of *Berberis integerrima* root (AEBIR) on kidney damage in CCL₄ - induced nephrototoxicity rats. In this study 32 male white wistar rats were randomly designated into four groups. Group 1: Control, Group 2: toxicant control, Group 3: toxicant rats treated with AEBIR (250 mg/kg) and Group 4: toxicant rats treated with AEBIR (500 mg/kg). Nephrotoxicity was induced by intraperitoneal injection of CCL₄ in olive oil (50%) twice a week for 4 weeks in rats [2]. Toxicant rats were treated by gavage for 4 weeks. At the end of experiment, levels of functional kidney markers such as serum creatinine, blood urea nitrogen, and urine protein and urine albumin were assessed in the serum and urine. Kidney tissue samples were collected from the animals in all groups to be investigated. In the toxicant rats, methanolic extract of *Berberis integerrima* significantly decreased the serum creatinine, blood urea nitrogen, urine protein and urine albumin in comparison to untreated toxicant rats. Histopathologically, the changes were in the same direction with biochemical findings. Because of anti-oxidant potentials of AEBIR, it may have a renal protective effect against CCL₄ induced nephrotoxicity in rats.

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**INFLUENCE OF DIFFERENT GROWTH MEDIA ON EMERGENCE
PERCENTAGE AND GROWTH PARAMETERS OF SEEDLING IN
RUMEX TUBEROSUS L.**

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Rumex tuberosus L. is a native herb, growing spontaneously in Northeast Iran, where its leaves are highly appreciated and consumed. Despite the high consumption, its knowledge is inconsiderable. So far, no attempt has been performed for its domestication. As a part of our continuous project on domestication of *Rumex tuberosus*, the seeds of plant were collected from their natural habitat and cultured under four different growth media, including 100% natural medium (NM), 50% cocopeat + 50% NM, 100% cocopeat, and 50% sand + 50% soil (V/V) in the growing trays under greenhouse conditions at the Horticultural Research Station of Horticultural Department of Ferdowsi University of Mashhad, 2012. The experiment was based on completely randomized design with four replications and 50 seeds per replicate. Seedling emergence percentage and rate and some growth parameters of seedling were studied. The results showed, the highest and lowest seedling emergence percent observed in 50% cocopeat + 50% NM (86.32%) and 50% sand + 50% soil (60.37%), respectively. The highest and lowest of seedling survival percentage was obtained in 50% cocopeat + 50% NM (74.55%) and 50% sand + 50% soil (55.34%), respectively. Maximum (62.54mm) and minimum (43.64mm) root length was in 100% cocopeat and 50% sand + 50% soil, respectively. The highest and lowest length, wide and number of leaf, petiolule length, fresh and dry weight of leaf, shoot and total plant were obtained under 100% natural medium and 100% cocopeat, respectively. Based on the present results, under natural growth medium seedlings were grown better than other growth media. It can be due to more compatibility of *Rumex tuberosus* under natural growth medium.

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ESTIMATION OF TOTAL PHENOLIC CONTENT IN
DRACOCEPHALUM KOTSCHY BLOSS., *MELISSA OFFICINALIS* L.,
ACHILLEA MILLEFOLIUM L., *VALERIANA OFFICINALIS* L.,
JUGLANS NIGRA L., *ARTEMISIA ABSINTHIUM* L., AND
ROSMARINUS OFFICINALIS L.

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Zarin giyah (*Dracocephalum kotschy*), Lemon balm (*Melissa officinalis*) and Rosemary (*Rosmarinus officinalis*) belonging to Lamiaceae. Yarrow (*Achillea millefolium*) and Wormwood (*Artemisia absinthium*) belonging to Asteraceae. Black walnut (*Juglans nigra*) belongs to Juglandaceae and Valerian (*Valeriana officinalis*) belonging to Valerianaceae. Different organs of these plants are used as medicine: *Dracocephalum kotschy*, *Melissa officinalis*, *Juglans nigra* and *Rosmarinus officinalis*: leaves; *Achillea millefolium* and *Artemisia absinthium*: flowers; *Valeriana officinalis*: roots. In the current research total phenolic contents (TPC) in the mentioned plants were evaluated. Because many investigations of allelopathic interactions have demonstrated the influence of phenolic compounds on physiological processes such as cellular expansion, membrane permeability, nutrient uptake, chlorophyll synthesis, photosynthesis, protein synthesis, enzymatic activity, respiration and water ratio [1]. Total phenolic content of crude extracts of studied plants was determined by Folin-Ciocalteu reagent [2]. Total phenolic content is expressed as equivalent to mg gallic acid (GAE) g⁻¹ DW of plant extract. TPC of studied plants were as followed: leaves of *Rosmarinus officinalis*: 150.76; flowers of *Artemisia absinthium*; 142.28; leaves of *Juglans nigra*: 71.15; leaves of *Melissa officinalis*: 67.98; leaves of *Dracocephalum kotschy*: 43.22; roots of *Valeriana officinalis*: 2.43 and flowers of *Achillea millefolium*: 1.22. Data showed *Rosmarinus officinalis* and *Artemisia absinthium* have the highest values of TPC among studied plants

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USE OF *PLANTAGO PSYLLIUM* SEEDS AS HOLDING VALUABLE
MEDICINAL PLANT AND AN ALTERNATIVE TO AGAR IN TISSUE
CULTURE *FRITILLARIA IMPERIALIS*

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Agar, derived from a type of sea weed that is causing the gel material used in the preparation of culture media. Production process, purification and purified by special plants which are designed to remove toxins. Agar is a polysaccharide with a high molecular mass media has the power to produce the gel. Solid agar medium texture comes. Solid media used in plant tissue culture and are mostly used for Plant Biotechnology Research. Except agar, allowing the use of other natural resources to produce the gel medium plant there. Among the items that can be used in the preparation of plant medium, seeds, plant herbs that can produce mucilage. In order to investigate the possible use of new materials in the preparation of culture media, plant In 1391 in Khuzestan Ramin Agriculture and Natural Resources, University of tissue culture laboratory experiment in a randomized complete block design using 1, 2, 3, 4, 5 g of Psyllium seeds of medicinal plants and control the use of agar in the presence and absence of activated charcoal medium Crown imperial plants were analyzed in three replicates. The results showed that the use of agar as a matter of routine maintenance on common Herbal medium But the use of medicinal plants as sources of new media plant can be evaluated and application. The experiment results show that the seeds of medicinal plants in tissue culture, not only supports the growth of plant samples But in some cases even better than the agar, psyllium use in tissue culture, the number bulblets more, shoot more in diameter, and are more suitable explants for callus production. [1-3].

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ESSENTIAL OIL COMPOSITION OF FLOWER OF *CITRUS AURANTIUM* AND ITS EFFECT ON MICROBIAL PROPERTIES OF GOAT MILK

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The aromatic plants are rich in essential oils characterized by a notable antimicrobial activity. For this reason, these substances can be used to delay or inhibit the growth of pathogenic or spoilage microorganisms [1]. The constituents of essential oils isolated by hydrodistillation of the flower of *Citrus aurantium* were examined by GC-MS. A total of 27 components were identified accounting for 88.1% of the total area percent from the chromatogram. Major components of the oil were included limonene (60.0%), linalool (5.1%), (z-beta) ocimene (4.6%), thymol (3.9%), trans-caryophyllene (2.3%) and myrcene (1.3%). The essential oil was added to goat milk at concentration of 0.25 ml/lit. Subsequently, the microbiological properties of freshly prepared flavoured goat milk and of the milk stored at $5 \pm 1^\circ\text{C}$ for 7 days were determined. Results showed that the addition of essential oils significantly affected the total count of bacteria in goat milk during the storage. It was demonstrated that this essential oil had the highest inhibitory effect on the total viable counts and its reduction rate at the end of the storage period.

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**THE EFFECT OF DIFFERENT LEVELS OF DIETARY CLOVE
ESSENTIAL OIL ON WATER HOLDING CAPACITY (WHC) AND
MEAT MOISTURE IN BROILER CHICKENS**

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The present paper studies the effects of different levels of Clove essential oil on water holding capacity and meat moisture in broiler chickens. The experiments were performed on 200 one-day-old chickens from Ross 308 strain in a completely random basis for 5 treatments, each consisting of 4 replicates with 10 broiler chickens. The treatments include a control treatment (basal diet), three treatments with basal diets and different levels of Clove essential oil (100, 300, and 500 ppm added to basal diet), and finally one treatment with 10 ppm antibiotic virginiamycin. Experimental diets were fed from 1 to 42 d of age. Water holding capacity and meat moisture of breast and thigh meat were measured at 42 days of age. The results suggest that increasing Clove essential oil in the diet at level 300 ppm leads to significant increase in water holding capacity breast meat compared to control group ($P < 0.05$). Also, using dietary Clove essential oil at level 300 and 500 ppm leads to an improvement in breast meat moisture broiler chickens, But, no significant difference was seen among treatment groups and control and antibiotic treated groups in water holding capacity and moisture thigh meat in broiler chickens ($p > 0.05$). Therefore, the present results indicated that dietary Clove essential oil, could improve water holding capacity and meat moisture in broiler chickens.

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**THE BLOCK STRUCTURE OF SODIUM ALGINATE FROM
SARGASSUM**

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Marine algae distributed in the Persian Gulf especially around seashore of ushehr and Hormozgan in south of Iran. These seaweeds have been source of food and medicine [1]. Alginate is a linear, anionic block copolymer heteropolysaccharide consisting of mannuronic acid and guluronic acid. The relative amount and sequential distribution of homogeneous M-blocks and G-blocks and alternating MG-blocks [2]. The solution viscosity, molecular weight and primary structure are fundamental to determine the swelling and gelling properties of alginate. Hence, an alginate with a higher level of G sequences presents a higher affinity for cross-linking agents than low G-containing alginates [3]. ¹HNMR spectroscopy is the main technique used in the investigation of alginate composition and structural patterns. Brown macroalgae were collected, cleaned, washed, air dried and grounded. The first step in alginate production is an ion-exchange with protons by extracting the milled algal tissue with mineral acid. In the second step, the alginic acid is brought into solution by neutralisation with alkali such as sodium carbonate to form the water soluble sodium alginate. The soluble sodium alginate is precipitated directly by alcohol. Extraction conditions of alginate were investigated. Samples extracted for 3×3h at 50°C were further purified by re-precipitation with ethanol. Values of the M/G ratio, F_{GG}, F_{MM} and F_{GM} (or F_{GM}) blocks were measured. The M/G ratio value was 0.89, higher than the ratio for most *Sargassum spp.* alginates (0.19–0.82). Values of M_w for alginate samples were also calculated using intrinsic viscosity data. The M_w value was 703 kDa. The M/G ratio and block structure have a strong effect on the physical properties of alginate. Therefore, according to viscosity of the alginate extracted from *Sargassum angostifolium*, it could be applicable in drug and food industry.

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MILK-CLOTTING ACTIVITY OF FRUIT EXTRACTS FROM
CUCUMIS MELO

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Numerous attempts have been made to replace calf rennet with other milk clotting proteases because of limited supply and increasingly high prices. Recent publications on new proteolytic enzymes from vegetable origin for milk clotting revealed that vegetable coagulants are a subject with growing interest. In this study, the fruits of *Cucumis melo* were fragmented into very small pieces, and dried at 40 °C for 24 h and then were ground for 1min in a laboratory grinder. The extracts were prepared by immersing 15 g of powder in different buffers viz; sodium citrate 50mM (pH 4-5), sodium phosphate 50 mM (pH 6-7), Tris- HCl 50 mM (pH 8-9) NaCl 0.85%. The extracts were used for their milk clotting activity (MCA) in comparison with control (renellase) according to the method described by Arima *et al* (1970). Skim milk 10% (w/v in deionized water) containing 10 mM CaCl₂. 2H₂O was used as the substrate and the pH was adjusted to 6.5. The assay was performed by adding 200 µl of rennet or enzyme extract in different buffers to a test-tube containing 10 ml of reconstituted skim milk solution, and the visible clot formation was observed at 37 °C while manually rotating the test tube from time to time. Results showed that coagulation activity was highly dependent upon pH and temperature. MCA of extract decreased gradually with increasing in the pH value from 4 up to 9. The pH optimum *C.melo* proteases was detected 4-5. There was no significant different in MCA of *C.melo* in comparsion with control at pH 4-7. Minimum MCA was observed in pH=9 (2.99 u/m) and NaCl 0.85% (3.42 u/m). The pH also affects the RCTs of the milk coagulation. Minimum RCT (2200s) observed in control, However ther was no significant difference between RTC of control and pH 4-5. Maximum RCT (4020s) was beling to pH 9. Stability of the enzyme was over a wide range of temperature (35-70 °C). Our study indicates that the extracts of the *C. melo* could be useful in the dairy industry for milk clotting, as an alternative to rennin.

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**INVESTIGATION THE EFFECTS OF CLOVE ESSENTIAL OIL ON
GROWTH PERFORMANCE IN BROILER CHICKEN**

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An experiment was conducted to evaluate the effects of Clove essential oil on growth performance in broiler chicken. The experiments were performed on 200 one-day-old chickens from Ross 308 strain in a completely random basis for 5 treatments, each consisting of 4 replicates with 10 broiler chickens. The treatments include a control treatment (basal diet), three treatments with basal diets and different levels of Clove essential oil (100, 300, and 500 ppm added to basal diet), and finally one treatment with 10 ppm antibiotic Virginiamycin. Effects on feed intake, weight gain and feed conversion ratio of the birds were measured at 10, 24 and 42 days of age. The results of these experiment indicated that Clove essential oils caused significant decrease in feed intake in starter and grower period than the control treatment. Birds receiving the diet containing Clove essential oil at the level of 300 ppm showed the highest weight gain than the control treatment ($p < 0.05$). Results showed Clove essential oil significantly decreased feed conversion rate in over the experimental period ($p < 0.05$). These results suggested that Clove essential oil could be considered a potential natural growth promoter for broiler chickens, and showed the best responses at the level of 300 ppm of inclusion.

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**THE ANTI-CANDIDA EFFECTS OF ETHANOLIC EXTRACTS OF
BERBERIS VULGARIS ROOT AND *ZATARIA MULTIFLORA* BOISS IN
VITRO AND THEIR COMPARISON WITH CLOTRIMAZOLE AND
AMPHOTERICIN B.**

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In recent years due to drug resistance in bacteria and fungi, special attention has created to medicinal plants. Most of systemic fungal infections are mainly caused by opportunistic pathogens such as *Candida* species. Although many researchers have carried out intensive studies attempting to develop new antifungal drugs some of which are now under clinical trials, Amphotericin B and the Azole compounds remain the mainstay of fungal systemic infection therapy. This study evaluated the anti-*Candida* effects of ethanolic extracts of *Berberis vulgaris* root and *Zataria multiflora* Boiss in vitro and their comparison with Clotrimazole and Amphotericin B. Materials and Methods: In this experimental study, ethanolic extracts of *Berberis vulgaris* root and *Zataria multiflora* Boiss were prepared with conventional methods. *Candida albicans* was cultured on dextrose agar medium. Then, after incubation period of 48 hours, anticandidal strength of the extracts, Amphotericin B and Clotrimazole was measured through zone of inhibition. The obtained data was analysed by using SPSS software package. Average zone of inhibition for ethanolic extract of *Berberis* was 21.5 mm, ethanolic extract of *Zataria multiflora* Boiss was 28.2 mm, pure ethanol 0 mm, Amphotericin B 16.4 mm and Clotrimazole 30.3 mm. Besides, these differences were statistically significant ($P < 0.001$). Conclusion: According to our findings, ethanolic extract of *Berberis* root and *Zataria multiflora* Boiss have anticandidal effects, and these effects are more prominent for ethanolic extract of *Zataria multiflora* Boiss. Because ethanol, by itself, doesn't have any anticandidal effects (zone of inhibition=0), we can conclude that all of the anticandidal effects are due to ethanolic extracts of *Berberis* and *Zataria multiflora* Boiss [1-3].

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EVALUATION OF ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENT OF THREE THYME SPECIES AT DIFFERENT HEIGHTS

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Antioxidants are main factors for neutralizing the free radicals which are active and harmful materials. So preparing antioxidation resources for reduction of oxidation stress effects is important [1, 2]. Plants are almost rich sources for phenolic compounds such as flavonoids, tannins and anthocyanins, which are the most important natural antioxidants [3]. Thyme is one of the main plants in the mint family and a rich plant source of polyphenolic compounds. The aim of present study was to evaluate the antioxidant potential of three *Thymus* species in Guilan province. *T. fedtschenkoi*, *T. caucasicus* and *T. pubescens* species were studied. Water extract were prepared, then Antioxidant activity of the samples were determined by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and total phenol was assessed by Folin-Ciocalteu method. The results of this study indicated that *T. pubescens* species had the highest antioxidant activity at high altitudes and relatively high level of phenol than other species. The lowest antioxidant activity was related to *T. pubescens* at low altitudes. *T. fedtschenkoi* and *T. caucasicus* after *T. pubescens* had the highest antioxidant activity respectively. So it can be said, water extract of *Thymus* exhibited strong antioxidant activity profile and is able to reduce the amount of DPPH free radical. Therefore *T. pubescens* species due to more antioxidant properties can be a potential source of antioxidant compounds for food and pharmaceutical industry.

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PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY IN DIFFERENT PARTS OF *CAPPARIS SPINOSA* RECH. F. IN NORTH OF IRAN

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Capparis spinosa Rech. F., Capparidaceae family is one of the most important of medicinal plants in Golestan province with has been growth wild in many ranges of ecological stress, for example in saline soil of sea level to mountainous soil tissue sandy clay region with dry cold climate in this research in many field observation different parts of plant (leaves, buds, flowers and fruit) were collected from sea level region in Gorgan and its ethpharmacological data obtained in May to June 2011 from rural leales and result showed that aerial parts of plants in blooming (buds) and fleshy fruits has been used in traditional medicine as tonic, anti tole, anti diabetes, diuretic, anti fungal, expectorant to treat of arteriosclerosis, hepatic diabetes, arthritis, toothache the sample were dried and extracted by methanol. Total phenol (TP) and total flavonoids (TF) contents were determined spectrophotometrically and their antioxidant activity was measured by 3 methods (DPPH, TAC and RP). Our finding indicated that the buds extracts had higher TF ($71.7 \pm 0.1 \text{ mgQUEg}^{-1}$) and TP contents ($71 \pm 0.4 \text{ mgGAEg}^{-1}$) and more antioxidant activity compare to other parts with IC₅₀ $3.97 \pm 1.02 \text{ mg/ml}$, especially in DPPH method on the other hands flower buds extract with highest content of TP and TF components, had better antioxidant activity to compare other parts. These results showed that there was a positive correlation between antioxidant activity and their secondary methabolites contents. These data which could confirm the traditional uses of the flower buds to treat of many current disorders of region of Iran, so we offer to do another research about, their medicinal activity *in vitro* and *in vivo* models.



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INVESTIGATION OF MEDICINAL SPECIES EFFECT ON INSECT
DENSITY AND DIVERSITY

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In order to investigate the effect of medicinal species effect on insect density and diversity, an experiment was conducted based on a complete randomized block design with 3 replications at the agricultural research station, Ferdowsi University of Mashhad, Iran, during 2012. Treatments included 8 medicinal species (*Hyssopus officinalis*, *Tanacetum parthenium*, *Echinacea purpurea*, *Ruta graveolens*, *Althaea officinalis*, *Trigonella foenum-graecum*, *Oenothera erythrosepala* and *Achillea millefolium*). The results indicated that effect of medicinal species on total insect density was significant. The highest insect density was observed in *Tanacetum parthenium*. Shannon and Margalof indices of insects were affected by plant species, significantly. So that the highest Shannon and Margalof indices were observed in *Tanacetum parthenium*. The highest percentage of predator populations was obtained in *Tanacetum parthenium* and *Althaea officinalis*. The lowest percentage of predator populations was observed in *Ruta graveolens*.

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**STUDY OF EFFECTS OF TYPES AND QUANTITIES OF SALT ON
SAVORY (*Satureja hortensis* L.) GERMINATION**

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In arid zones soil salinity is a major factor limiting plant productivity. Salinity problems reduce plant growth and vigor by altering water uptake and causing ion-specific toxicities or imbalances. The most plants are sensitive to salt stress at germination stage and determine salt effects on this stage is very important. Savory (*Satureja hortensis* L.) is one of the important medical and medicines plant and used as fresh vegetable. To investigation on effect of salt and its different levels on germination stage on *Satureja* one experiment were carried out (2011) at lab physiology (to germination test) of agriculture faculty of Ramin university. In first experiment (germination test) four salt (Na_2HCO_3 , Na_2CO_3 , NaCl and CaCl_2) with four salinity levels (EC= 2, 4, 6 and 8 ds/m) and distilled water (as control) under germinator condition (25°C) were used. This investigation was performed as factorial experiment under complete Randomized Design (CRD) with four replications. It was concluded that effect of treatment on germination percentage, germination speed, seedling normal and in normal Percentage, vigor1 and vigor2 index was significant different ($P=0.05$). The highest mean was related to control (distilled water). Na_2CO_3 and NaHCO_3 had the highest effect to reduction of above characters. Na_2CO_3 and NaHCO_3 had the low to effect than other salts. Savory Na_2HCO_3 and Na_2CO_3 salts than the highest sensitivity and salts of NaCl and CaCl_2 and are less sensitive.

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HISTOPATHOLOGIC STUDY ON THE EFFECT OF *TRIBULUS TERRESTRIS* EXTRACT ON MICE TESTICLES AFTER HEATING

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Tribulus Terrestris is a single year plant found in tropical areas. It is used for sexual enhancement and as a cure for oligospermia, azoospermia in men infertility and prostate hyperplasia and these effects were probably duo to androgen increasing like testosterone and LH and improvement movement and number of sperms. The extract of this plant contains protodioscin, which is a steroid saponin. There are some reports about anabolic effects and increase in androgenic hormones while there is not any report about its effects on spermatogenesis. Since final stages of spermatogenesis and spermatids maturity affected by androgenic hormones, there need to implement vast studies about effects of this plant on spermatogenesis. The purpose of this research is to study the effects of *Tribulus Terrestris* extract on Mice Testicles after Heating. 60 male adult mice used to implement this study. The mice divided into heated and control groups and each group divided into two subgroups. One group gavaged 50 mg/kg of metanolic extract of *Tribulus Terrestris* daily until end of the study and another group just distilled water. Scrotum of heated group mice heated for 15 minutes in 43°C bath environment after anesthesia while control group mice scrotum kept in 23°C bath within the same period. After 28 and 42 days from the study startup, the mice killed by cervical dislocation method after being weighed and then their testicles removed immediately and fixed by formalin in order to prepare pathologic slides. The results obtained from this study delineated suitable effects of *Tribulus Terrestris* extract on spermatogenesis in those mice their testicles heated.



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**GERMINATION AND SEEDLING GROWTH OF FLAX UNDER
DIFFERENT SALINITY LEVELS OF SODIUM CHLORIDE**

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In order to evaluate germination and seedling growth of three flax varieties (*linum usitatissimum* L.) an experiment was carried out as factorial with two factors: three flax varieties (Iranian, French and Canadian), and six salinity levels of sodium chloride (0, 40, 80, 120, 160 and 200 Mm) based on randomized complete block design with four replicates, in Agronomy Department of Shahrekord University. The results showed that variety and salinity levels affected the Germination percentage (GP), germination rate (GR), coefficient of velocity of germination (CVG), plumule and radical length and dry weight, significantly. Iranian cultivar had the highest GR. Iranian varieties had the highest GR and radicle weight while Canadian varieties showed the highest plumule weight. In each cultivar, increasing in NaCl concentration adversely affected early growth parameters including plumule and radicle length and dry weight as well as various traits of germination, except the mean germination time (MGT).

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ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF FLAVONOID-RICH FRACTION OF *FRORIEPIA SUBPINATA*

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Free radicals, chemical reactions and several redox reactions of various compounds may cause protein oxidation, DNA damage and lipid peroxidation in living cells. In order to reduce damage to the human body and prolong the storage stability of foods, antioxidants are often used for industrial processing [1]. There are two basic categories of antioxidants: synthetic and natural. The use of synthetic antioxidants is restricted because of their carcinogenicity. Thus, there has been increasing interest in finding natural, effective, and safe antioxidants, since they can protect the human body from free radicals and retard the progress of many chronic diseases [2]. Published data indicate that flavonoids isolated from plants have certain antioxidant activity on free radicals and can be explored as novel potential antioxidants. Epidemiological studies revealed that flavonoid-rich diet is correlated with the increased longevity and decreased incidence of cardiovascular diseases seen in these populations despite their high intake of fat [3]. Present study has been carried out to examine antioxidant and antibacterial activities of flavonoid-rich fraction of *Froriepia subpinata*. Antioxidant activity of flavonoid-rich extract was investigated by employing different in vitro assay systems, i.e. DPPH and nitric oxide radicals scavenging, reducing power, scavenging of hydrogen peroxide, linoleic acid and iron ion chelating activity, in order to understand the usefulness of this plant as a foodstuff as well as in medicine. The results indicated that flavonoid-rich fraction of *F. subpinata* possesses good free radicals scavenging and antioxidant activity. The results obtained of antibacterial assay showed that flavonoid-rich fraction suppressed the growth of both gram-positive and gram-negative bacteria cultures. These results confirmed the potential use of *F. subpinata* in food industry for the preservation of food stuffs against bacteria and for increasing the shelf life of food stuffs.

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**THE EFFECTS OF BIOLOGICAL FERTILIZER AND
INTERCROPPING ON SOME QUANTITY AND QUALITY
CHARACTERISTICS OF FENNEL (*FOENICULUM VULGARE L.*)**

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In order to evaluate the effect of biofertilizer on fennel (*Foeniculum vulgare L.*), alfalfa (*Medicago sativa L.*) and different intercropping, an experiment was conducted at College of Agriculture, Shahed University, Tehran, Iran, in year 2011. The experiment design was split plot in the base of randomized complete blocks with six treatments and three replications. The experimental treatments included fertilizer (control: no fertilizer and biofertilizer: *Azospirillum/Azotobacter*, bio phosphorous), and intercropping (fennel (100%), 100% alfalfa + 50% fennel, 100% alfalfa + 100% fennel). Results showed that the maximum amounts of fennel height, number of node, dry weight and essential oil yield were obtained by applying biofertilizer. Maximum dry weight and essential oil yield and highest fennel height were observed in fennel and 100% alfalfa + 100% fennel treatments, respectively. Interactions of two treatments of biofertilizer and intercropping were significant. Also, Results showed that the maximum dry weight and essential oil yield was obtained from biofertilizer and fennel treatments.



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**BENEFIT OF ALFALFA AND FENNEL INTERCROPPING IN
DIFFERENT LEVELS OF PLANTING PATTERN AND
BIOFERTILIZER**

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In order to evaluate the effect of biofertilizer on Alfalfa (*Medicago sativa* L.) and Fennel (*Foeniculum vulgare* L.) on different intercropping, an experiment was conducted at College of Agriculture, Shahed University of Tehran, Iran, in year 2011. The experiment design was split plot on the basis of randomized complete block with three replications. Two levels of fertilizer: control (no fertilizer), biofertilizer (*Azospirillum/Azotobacter*, bio phosphorous fertilizer) was allocated to the main plots and different intercropping of Alfalfa and Fennel at 4 levels in subplots: sole alfalfa (100% alfalfa), sole fennel (100% fennel), 100% alfalfa + 50% fennel, 100% alfalfa + 100% fennel. Results showed that the highest alfalfa and fennel yield were obtained by applying biofertilizer. Maximum yield of alfalfa and fennel and highest total yield were observed in sole cropping and 100% alfalfa + 100% fennel treatments, respectively. Interactions of two treatments of biofertilizer and intercropping were significant. Results showed that the maximum yield of alfalfa and total yield was obtained from biofertilizer and 100% alfalfa + 100% fennel. The highest Land Equivalent Ratio (LER) was obtained in 100% alfalfa + 100% fennel intercropping and no fertilizer. The lowest LER was in 100% alfalfa + 50% fennel intercropping and biofertilizer.



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**FORMULATION OF SOLID LIPID NANOPARTICLES CONTAINING
HERBAL EXTRACTS OF *DRACOCEPHALUM MOLDAVICA* L. AND
VIOLA TRICOLOR L. AS A SUNSCREEN**

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Sunscreens are commonly used in cosmetics for skin protection against UV radiations. Nanoparticle formulations can be used as delivery vehicle for the sunscreens and potentially have advantages in terms of retention on skin, lack of penetration across the epidermal layer and UV attenuation by both absorption and scattering. Solid lipid nanoparticles (SLN) are considered as remarkable carriers to develop sunscreens' safety and effectiveness. Moreover natural substances extracted from plants have been recently considered as potential sunscreen resources because of their ultraviolet ray absorption in the UV region and also their antioxidant activity. In this study, ethanolic extracts of the *Dracocephalum moldavica* L. and *Viola tricolor* L. were prepared and incorporated in different concentrations to SLNs which prepared via the high shear homogenization method with various amounts of lipids (Witepsol H15, H35) and surfactants mixtures. SPF of the SLNs was determined spectrophotometrically on the basis of a modified Transpore® tape method. Results showed nanoparticles had the particle size range from 400 to 600 nm. SLNs consist of herbal extracts showed a loading percentage more than 98% with high absorption between 290-415 nm. Calculated SPF for the UVB area was 28.55 for SLNs consist of *Viola tricolor* L. and 26.58 for SLNs consist of mixture of *Dracocephalum moldavica* L. and *Viola tricolor* L. Considering harmful skin disorders that caused by UV rays and also in deficit of suitable formulations with long time activity and low side effects, the use of natural products such as *Dracocephalum moldavica* L. and *Viola tricolor* L. extracts in a SLN formulation can be helpful for presentation of a new and effective sunscreen formulation.

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CHEMICAL COMPOSITION OF PELARGONIUM QUERCETORUM
ESSENTIAL OIL

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The volatile constituents in the essential oil of *Pelargonium quercetorum* Agnew., growing wild in Kurdistan, Iran were investigated through GC and GC/MS technique. Twenty-six compounds, representing 21 (80.77%) of the total oil were identified. The main components were: alpha-pinene (25.28%), alpha-fenchyl acetate (20.63%), limonene (9.94%), beta-caryophyllene (8.20%), camphene (4.31%), delta-cadinene (3.32%), beta-pinene (3.21%), alpha-amorphene (2.80%), valencene (2.73%), ledene (2.25%) and p-cymene (1.63%) [1,2].

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**EVALUATING THE EFFECT OF HEAVEY METALS ON
GERMINATION PARAMETERS OF MEDICINE PLANT OF
CANNABIS SATIVA L.**

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The presence of heavy metals is one of the major environmental pollution which can be reducing plant growth. An experiment was conducted to evolution of various concentrations of heavy metals viz. cadmium 0, 5, 10, 15, and 20 mg lit⁻¹ and lead concentrations (0, 50, 100, 150, and 200 mg lit⁻¹) on germination percentage, dry mass, elongation of radicle and shoot and seedling of the test crop on base of completely randomized design with triplications. The analysis of variance showed that different concentrations of cadmium significantly decreased the length of radicle, shoot, seedling and dry weight except seed germination of the test seeds in 95% confidence level statistically. While lead had no significant effect on the different parameters of test seeds. The inhibition effect was order: 0> 5> 10>15>20. It is concluded that where cadmium is high studied plant might be use for phytoremediation.

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ANTIOXIDANT ACTIVITY OF SOME EXTRACTS FROM AERIAL PARTS OF *AJUGA CHAMAECISTUS* SSP. *TOMENTELLA*

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The genus *Ajuga*, belongs to Lamiaceae family, is one of the exclusive subspecies in the flora of Iran. The plants of this genus are used traditionally for treatment of joints pain, gout and jaundice [1, 2]. The aim of this study was to evaluate possible antioxidant activity of methanol 70% extract and partition fractions of hexane, diethyl ether, and *n*-butanol fractions obtained from total methanolic extract. Ferric reducing antioxidant power (FRAP) assay, and 2, 2-diphenyl-1-picrylhydrazyl (DPPH), scavenging potential, were used to study antioxidant activity. The methanol extract was found to have the highest radical scavenging activity and antioxidant power as IC₅₀ 13.63 ± 0.05 mg/ml, and 116.15±12.0 mmol FeII per 100 gram dried plant, respectively. It can be concluded that, methanol extract of this plant could be considered as a potential source of natural antioxidants.

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**ANATOMICAL STUDY OF LEAF AND STEM OF
CARTHAMUS TINCTORIUS L. IN IRAN**

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Safflower, *Carthamus tinctorius L.*, is a member of the family Compositae or Asteraceae, that is distributed in center and southwest of Iran [1]. *C. tinctorius* dilates arteries, reduces hypertension and increases blood flow and, hence, oxygenation of tissues. It also inhibits thrombus formation and, over time, dissolves thrombi. Many prescriptions for invigorating blood circulation, especially those for treatment of heart disease, include safflower along with other herbs and have been used in treatment of many diseases [2]. In this study we investigated the anatomical features of leaf and stem structure in *C. tinctorius*. Stems of *C. tinctorius* with primary growth have pith in the center, with vascular bundles forming a distinct ring visible in cross-sections. The outside of the stem is covered with an epidermis, which is covered by a waterproof cuticle. A cortex of parenchyma cells lies between the epidermis and vascular bundles. *C. tinctorius* has vascular bundles in a ring arrangement. The stems have bundles in a ring surrounding parenchyma cells in a pith region. In leaf blade the palisade parenchyma cells have occurred in one side and in two rows the spongy parenchyma cells have occurred in the other side and therefore the type of leaf is dorsiventral. Also sclerenchyma cells surrounded the bundle sheath.

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**HISTOPATHOLOGIC EFFECT OF *RUTA GRAVEOLENS* EXTRACT ON
CHANGES OF KIDNEY TISSUE IN MICE**

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Ruta had is a traditional herbal medicine specifically in Iranian traditional medicine and

has significant characters. Using common herbal medicine such as Ruta can affect excreting organ of body like kidney. This study had been performed to survey effects of *Ruta graveolens* extract on histopathologic changes in kidney tissue of mice. This is an experimental study which made on 30 NMRI mice in the weight range of 25 to 35 gr. Mice were divided in 6 quintuple groups. Groups 1 to 4 injected by the doses of 200,300,400 and 500 mg/kg of hydro-alcoholic extracts respectively. Solvent of extract injected in group 5 mice and group 6 mice were intact. The injection was performed intraperitoneal and three times in a week. In the 7th day mice were injected by ketamine-xylisine and were anesthetized deeply then kidney tissues were extracted and after H&E coloring analyzed pathologically. Different pathologic factors were studied in kidney tissue of mice including atrophy and inflammation by existence of inflammatory cells. There were no significant existence of glumeronephritis and pyelonephritis characteristic sign and vascular congestion between different dose groups and control groups. A mild degree of vascular congestion was seen in all doses. But no changes about pyelonephritis and glumeronephritis were observed. It seems that different doses of hydro-alcoholic extract of *Ruta graveolens* had no toxic effect on histopathology of kidney tissue but making congestion can predispose kidney to glumeronephritis probably [1, 2].

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THE EFFECT OF SOME TREATMENTS ON SEED DORMANCY AND GERMINATION OF *FERULAGO ANGULATA*

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Ferulago angulata is one of the medicinal plant of western Asia, contains essential oils that are used as a food preservative that belongs to *Apiaceae* plants. According to International Seed Testing Association (ISTA) reports, all of this species seeds have shown dormancy that reduce their seed viability. In order to study the effect of some treatments on seed dormancy and germination of *Ferulago angulata*, an experiment was carried out as randomized complete block design with four replicates, in Agronomy Department of Shahrekord University. Dormancy breaking treatments were: pre-chilling (10, 20, 30 and 40 days), GA₃ (500, 1000, 1500 and 2000 ppm), pre-chilling (10, 20, 30 and 40 days) combined with various levels of GA₃ (500 and 1000 ppm) and potassium nitrate (0.2 %) for 48 and 72 h. The results showed that pre-chilling for 40, 30 and 20 days had the highest effect on Germination percentage (GP), germination rate (GR), coefficient of velocity of germination (CVG), plumule and radical length and dry weight, respectively. Consequently, these treatments recommend for breaking of *Ferulago* seeds dormancy.

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EVALUATION OF ANTIBACTERIAL EFFECTS OF DIFFERENT FRACTIONS OF ETHANOL EXTRACT OF *TEUCRIUM POLIUM* ON SELECTED GRAM POSITIVE AND GRAM NEGATIVE BACTERIA BY BIO-AUTOGRAPHY METHOD AND DETERMINATION MIC

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Teucrium polium L.(Labiatae) is an endemic species of Iran. It is used as anti-diabetes, anti-hypertensive, anti-nociceptive, anti-spasmodic, anti-oxidant, anti-inflammatory, and anti-convulsant agent and etc. In this study components were separated with most anti microbial effect on *Teucrium polium*, then was evaluated anti bacterial effects of fractions Petroleum ether, dichloromethane, ethyl acetate, crude and total ethanolic extract of *Teucrium polium* obtained by sonication on 10 microbial species including *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Micrococcus luteus*, *Klebsiella pneumonia*, *Salmonella typhimurium*, *Bacillus subtilis*, *Bacillus lyscheniformis*, *Serratia marscensis* by MIC and disk diffusion and bioautography methods. Extracts of aerial parts of the plant consist of leaves and flowers which were collected separately from Kerman, isolated by sonication. Then was fractioned by petroleum ether, dichloromethane and ethyl acetate. Finally the extract MIC was evaluated by agar dilution method. For this, the extract was diluted in the range of 64000 to 500 μ g/ml in the Muller-Hinton Agar medium. Then the concentration of 0.01 of microbial suspensions was applied on the culture media. DMSO was also been used as a co-solvent in this study for identification of the most effective fraction disk diffusion method used by loading 1 mg of each fractions on the sterile paper disks. Then 0.5ml of the concentration of the 0.01 of microbial suspensions equivalent of half of mac-farland was applied on the culture media. By putting the disks in their own places on the culture media and after 24 hours incubation the inhibitory zone was measured. In bioautography the most effective fraction isolated by solvent system of Ethyl acetate, Trifluoroacetic acid, Methanol (10- 0.1- 0.1) by means of thin layer chromatography. After putting the chromatograms on culture media, incubation and spraying of tetrazolium indicator, the inhibitory zone appeared and expressed by R_f. MIC was determined for *Staphylococcus epidermidis* 500 μ g/mL, *Staphylococcus aureus* 1000 μ g/mL, *Pseudomonas aeruginosa* 2000 μ g/mL, *Escherichia coli*, *Salmonella typhimurium*, *Serratia marscensis* and *Bacillus subtilis* 4000 μ g/mL and for *Bacillus lyscheniformis* 8000 μ g/ml and for *Micrococcus luteus* and *Klebsiella pneumonia* 16000 μ g/mL. Result of disk diffusion showed that Ethyl acetate fraction has the highest antibacterial effect on standard bacteria. TLC plates under UV light from all five spots with R_f 0.1, 0.4, 0.44, 0.6 and 0.9 obtained, These spots was showed after spraying indicator Natural Product (0.1 in methanol) under UV₃₆₆ white, yellow, orange, white, and blue, respectively.



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AN EVALUATION OF THE ANTIMICROBIAL EFFECT OF *ALLIUM SATIVUM* (GARLIC) ON *STAPHYLOCOCCUS AUREUS*, *ESCHERICHIA COLI*, *SALMONELLA*, *BACILLUS SUBTILIS*, *STAPHYLOCOCCUS EPIDERMIDIS*, *PSEUDOMONAS AERUGINOSA*, *BACILLUS CEREUS* & *STREPTOCOCCUS PYOGENES*

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Garlic or *Allium sativum* is a member of the onion genus and the close relatives of this plant are onion, shallot, leek, chive and rakkyo. It is native to central Asia and is used for both culinary (because of its pungent flavor) and medicinal purposes. Using garlic in foods, enhances thiamin absorption and reduces the likelihood of beriberi (thiamin deficiency). Several studies suggest that garlic has antibacterial, antiviral and antifungal properties. Garlic has many other effects such as preventing heart diseases, cancers, hypertension and common cold, reducing platelet aggregation, a remedy for chest problems, digestive disorders and fungal infections such as thrush & Using antibiotics as a treatment of various bacterial infections, has increased the antibiotic resistance among microorganisms, thus the need for development of natural and new antimicrobials is felt. In this study we evaluated the antimicrobial effects of *Allium sativum* on eight different bacteria. First we peeled the garlic cloves, cut them into pieces and smashed them, then vortexed them in order to gain a raw extract of garlic. Known cultures of *Staphylococcus aureus*, *Escherichia coli*, *Salmonella*, *Bacillus subtilis*, *Staphylococcus epidermidis*, *Pseudomonas Aeruginosa*, *Bacillus cereus* & *Streptococcus pyogenes* were obtained from the Microbiology Department of Veterinary faculty, University of Tehran. Seven Mueller Hinton plates for each organism (except for *streptococcus pyogenes*) and one Blood Agar plate for *Streptococcus pyogenes* were inoculated with broth culture of organisms. Then using a sampler we spread the *Allium sativum* on eight blank discs one by one and put it in the centre of each plate. The plates were incubated at 37°C for 24 hours. After 24 hours of Incubation, we observed the plates and calculated their zones of inhibition. The zones of inhibition were: *Staphylococcus aureus*: 35 mm, *Escherichia coli*: 24 mm, *Salmonella*: 20 mm, *Bacillus subtilis*: 30 mm, *Staphylococcus epidermidis*: 32 mm, *Pseudomonas Aeruginosa*: 10 mm, *Bacillus cereus*: 25 mm & *Streptococcus pyogenes*: 12 mm. The results of this study suggest that or *Allium sativum* has very high antimicrobial activity.

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**EFFECT OF HALOPRIMING ON GERMINATION OF *OCIMUM*
BASILICUM AND *CORIANDRUM SATIVUM***

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Priming with different salts is general technique in seed enhancement. But various plant species have different reaction to these techniques. Therefore, present study was conducted in the laboratory of Agriculture Faculty, University of Birjand in 2011 with treatments involved 50, 100, 150 and 200 mM concentrations of KH_2PO_4 and unprimed one as control in *Ocimum basilicum* and *Coriandrum sativum*. Results showed that priming improves germination percentage and rate, seedling vigor, root length, MGT and T_{50} in *Coriandrum sativum*; and also had just positively affects on T_{50} in *Ocimum basilicum* and in other indices best priming treatments had no significant difference with control. Priming with 200 mM reduced root and shoot length and seedling vigor as well. The best priming treatment was 150 mM in both plants.



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**GROWTH INDICES OF SWEET BASIL (*OCIMUM BACILICUM*)
AFFECTED BY COMBINATION OF BIOLOGIC AND PRIMING SEED
TREATMENTS**

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Priming and biologic treatments are effective methods in growth enhancement of medicinal plants. Therefore present an experiment was carried out in the greenhouse of Agriculture Faculty, University of Birjand with factorial CRD statistical design in 2011. Factors were 1- Bacteria treatments a (*Pseudomonas sp* 168), b (*Azetobacter sp*), c (compose of *Pseudomonas sp* 168 and *Azetobacter sp*) and d (without Bacteria treatment), 2- priming with KH_2PO_4 (100 mM concentration and without priming). Results showed that shoot fresh weight and dry matter was affected by using of biologic treatment and had no significant effect on seed priming. But seed priming positively affect on plant height.



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**EFFECT OF COMBINED BIOLOGIC AND PRIMING SEED
TREATMENTS ON P AND K CONCENTRATION IN SHOOT OF
NIGELLA SATIVA L**

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Both priming and biologic seed treatments are useful methods for plant growth especially in medicinal plants. Thus present study was carried out in the greenhouse of Agriculture Faculty, University of Birjand with factorial CRD statistical design in 2011. Factors were 1- Bacteria treatments a (*Pseudomonas sp* 168), b (*Pseudomonas sp* 187), c(compose of *Pseudomonas sp* 168 and *Pseudomonas sp* 187) and d(without Bacteria treatment), 2- priming with KH_2PO_4 (50 mM concentration and without priming). Results showed that biologic treatments caused increase in both P and K concentrations. Also, priming has excessive effect in these two elements concentrations in shoot of *Nigella sativa* L. Highest shoot concentration of P and K was observed in (*Pseudomonas sp* 168+priming) and (*Pseudomonas sp* 168+187+priming) respectively. Therefore, combine application of priming and biologic seed treatments can be useful method for increasing of P and K concentration in medicinal plants.



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**EFFECTS OF DIFFERENT TREATMENTS ON MICROSPORE
EMBRYOGENESIS IN *THYMUS DAENENSIS***

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Double Haploid lines are commonly used in plant breeding programs for the production of homozygous lines in a single generation. Androgenesis is one of the most efficient methods for doubled haploid production and can be performed using anther or isolated microspores culture. In this research, microspore embryogenesis of one valuable medicinal plant, *Thymus daenensis* was studied. The flowers, collected at the late uni-cellular microspore development stage, were sterilized with ethanol (70 % for 2 minutes) and then sodium hypochlorite (2.5% for 5 minutes). Microspores were isolated using sucrose 13 %. In order to improve the formation of multi-cellular structures, we compared the efficiency of twelve different pretreatments (cold pre-treatment for 3, 6 and 9 days, heat pre-treatment for 4, 8 and 12 days, carbon starvation for 5, 10 and 15 days, various levels of 2, 4-D (25, 35 and 45mg/l)) and two different induction media (NLN-13 and FHG). The experiment was conducted as factorial based on CRD with three replications. Multi-cellular structures were observed in NLN-13 as well in FHG induction media. The greatest numbers of multi-cellular structures were observed in the NLN-13 medium and temperature treatment of 30 °C for 8 days and 2, 4-D treatment of 25 mg/l.

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**KNOWLEDGE, ATTITUDE AND PRACTICE OF PEOPLE IN RURAL
AREA OF SIAHKAL TOWARD MEDICINAL PLANTS, GUILAN, 2012**

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Consumption of medicinal plants was common all over the world traditionally. Regarding to side effect of chemical drugs and low effect of some of them on some diseases, most of people has tended to herbal medicine and complementary medicine. In this study we evaluated knowledge, attitude and practice of people toward medicinal plants in rural area of Siahkal. This is a descriptive study. The tool for gathering data was a questionnaire had three parts that evaluate knowledge, attitude and practice and demographic data. Alpha Cronbach of questionnaire was determined as 0.63. 116 persons of 30 families of rural area of Siahkal were entered in the study and data asked them as interview. Sampling was clustery. After data collection, they analysed by SPSS software version 18.0 and descriptive statistic tests. All of administrators of families were male. Mean age of them was 53.20 ± 15.52 . 63.3% was illiterate, 73.3% was agriculturist and 96.7% was married. 96.7% had low knowledge and 3.3% had moderate knowledge about medicinal plants. 69% of them believe that presenter of medicinal plants services is non-medical organizations. All of them were familiar with herbal medicine by acquaintances. 93.3% of them had moderate attitude to herbal medicine. The most factor affecting development of herbal medicine in their view was advertisement (56.7%). 76.7% of them had been used medicinal plants at least one time in the recent past year. 96.7% was used medicinal plants without consulting their physician. 40% of them at least used a herb for a disorder truly. 67.9% believe that effectiveness of medicinal plants are very much. Knowledge of people of this area was low but they used herbal medicine traditionally. They did not know any about probable complications of medicinal plants. Gathering data of people traditional medicinal plants knowledge is effective for plannig and education of them in order to be familier with all of dimension of medicinal plants is to be necessary [1, 2].

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**THE EFFECT OF FEEDING DIFFERENT LEVELS OF SUNFLOWER
SEED ON DISSIPATION COUNT OF WHITE BLOOD CELLS IN
LAYING HENS**

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This experiment was conducted to determine the effects of the dietary sunflower seed on immune system of laying hens. 160 Hy-line w-36 at 30 weeks of age was randomly divided into four treatments with 5 replicate and 8 hens in each replicate. Control group was fed basal diet without sunflower seed addition. Experimental groups were offered diets having 3%, 6 % and 9% sunflower seed. To determine dissipation count of white blood cells, 2 birds from each replicate was bled via wing at the end of experiment (56 day). Data was analyzed based on completely randomized design using GLM procedure of SAS. addition of sunflower seed had significantly increased the number of lymphocyte ($P>0/05$). The H/L ratio was also influenced by the level of sunflower seed in the diet.



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**EFFECT OF SOLVENT ON THE QUALITY AND QUANTITY OF
TANNIN EXTRACTION FROM *MENTHA PIPERITA***

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Tannin compounds known to be hard, dry and have the ability to bond to the protein, causing it to be deposited. The most important therapeutic effects are anti-diarrhea, help heal wounds and infections of the throat and trachea (overall digestive and respiratory tubes). They also have antibacterial properties. [1]. This research was conducted in Khorasan Razavi Agricultural Laboratory in 2012. Treatments studied include mint, *Mentha Piperita* with Soxhlet extraction solvent for two hours with water, Soxhlet with ethanol for two hours, soaking in water and soak for 24 hours in ethanol for 24 h, respectively. After Solvent deletion the extracts the quantity of tannins were measured with spectrophotometr . Much tannin extraction using Soxhlet and solvent water method (0) and solvent soaking water (0), using Soxhlet and solvent ethanol (1) and the method of soaking in ethanol (1), respectively. The results show that the extraction solvent has a significant effect on the extraction of tannin. Ethanol can maximizae extraction of tannin but water can not extracting tannin from mint. The color of extract shows that the tannins in mint were from proanthocyanidines .

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**EFFECT OF EXTRACTION SOLVENT ON THE EXTRACTION OF
ANTHOCYANINS FROM MINT**

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Anthocyanins (also anthocyanins; from Greek: *άνθος* (*anthos*) = flower + *κυανός* (*kyanos*) = blue) are water-soluble vacuolar pigments that may appear red, purple, or blue according to the pH. They belong to a parent class of molecules called flavonoids synthesized via the phenylpropanoid pathway; they are odorless and nearly flavorless, contributing to taste as a moderately astringent sensation [1]. Anthocyanins occur in all tissues of higher plants, including leaves, stems, roots, flowers, and fruits. Anthoxanthins are their clear, white to yellow counterparts occurring in plants. Anthocyanins are derivatives of anthocyanidins, which include pendant sugars. Cancer research on anthocyanins is the most advanced, where black raspberry (*Rubus occidentalis* L.) preparations were first used to inhibit chemically induced cancer of the rat esophagus by 30-60% and of the colon by up to 80%. Effective at both the initiation and promotion/progression stages of tumor development, black raspberries are a practical research tool and a promising therapeutic source, as they contain the richest contents of anthocyanins among native North American *Rubus berries* [2]. This research was conducted in Khorasan Razavi Agricultural Laboratory in 2012. Treatments were Soxhlet extraction for two hours with water, Soxhlet with ethanol for two hours, soaking in water and soak for 24 hours in ethanol for 24 h. After removal of the solvent and bringing the volume to 150 cc measure and compare the amount of anthocyanins was performed using spectrophotometric techniques. The anthocyanins extracted by soxhlet solvent water (0.588), with soxhlet ethanol (1), by soaking in water (1) and maceration with ethanol (1), respectively. As has been shown in previous research on anthocyanins increasing temperature has negative effect of on anthocyanin content. Ethanol has lower destruction of anthocyanins in comparison of water because of lower spot welding and shows highest extraction alongside maceration method.

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**PHYLOGENETIC STUDIES OF *CROCUS* SPECIES NATIVE TO IRAN
WITH SURVEY PROTEIN PROFILES**

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Saffron (*Crocus sativus* L.) is a Native plant of Iran including various medical and food properties. Saffron has an important place and great background in terms of economical issues in Iran. This paper presents a study of protein patterns of 10 various kinds of saffron Belonging to four species of the genus *Crocus*, including 4 crop type (*Crocus sativus*) and 6 wild type from *C. michelsonii*, *C. speciosus* and *C. cansellatus* species to determine genetic versatile available using vertical electrophoresis of protein storage corm on poly acril amid gel utilizing SDS-PAGE method. Dendrogram of ecotypes distance was plotted utilizing NTSys software. Genetical Distance was also calculated in samples using SPSS software. The results of electrophoresis of 10 selected types of 26 protein band which was maximum in quality in Roshtkhar ecotype. The results dendrogram showed that ecotype being studied are distinguishable into 3 different groups. Crop ecotypes were divided in a distinguished group and had a high genetical together (94%). It was also observed that there is minimum similarity (15%) between ecotype of *C. michelsonii* and ecotype of Toroq among studied ecotypes. The survey indicate high potential presence of genetical variety between *Crocus* species them. Different banding pattern observed showed that cultivate saffron in Iran, have not originated from a clone, but have different genotypes and diversity.

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**MORPHOLOGICAL DIVERSITY AMONG WILD POPULATIONS OF
SALVIA SAHENDICA (LAMIACEAE) IN IRAN**

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The genus *Salvia* L. is one of the largest members of the Lamiaceae family and includes about 900 species distributed all over the world. In flora of Iran this genus is represented by 61 species, 17 of which as *Salvia sahendica* are endemic [1]. Members of the genus *Salvia* have been shown to possess a significant array of biological and pharmacological properties such as spasmolytic, astringent and antiseptic [2]. *S. sahendica* is growing in the northwest of Iran, especially around the Sahand Mountain located in the East Azerbaijan Province [3]. In the present study, morphological diversity among twenty-one individuals of seven wild populations of *S. sahendica* was studied for determining valuable characteristics for future breeding programs and medicinal purposes. 19 quantitative and qualitative characteristics such as length and width of leaf, number of nodes and internodes, length of stem and inflorescence, length of stamen and pistil and leaf color and etc. were evaluated. Cluster analysis at similarity coefficient distance of about 25 divided 21 individuals in two main groups. The main groups consisted of 19 and 2 individuals, respectively. Principal Component Analysis (PCA) explained about 83% of the variation related to main effective characters such as leaf and inflorescence length, leaf width, number of node and internode length.

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QUANTIFICATION OF TAXOL IN WILD MATURE AND *IN VITRO*
CELL SUSPENSION CULTURES OF *TAXUS BACCATA* AND *TAXUS*
BREVIFOLIA: A COMPARATIVE STUDY

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Taxol (paclitaxel) is one of the most effective anti-cancer drugs ever developed. The natural source of taxol is the inner bark of several *Taxus* species, especially *T. baccata* and *T. brevifolia*, but it accumulates at a very low concentration and with a prohibitively high cost of extraction [1]. Another problem is that the use of inner bark for taxol production implies the destruction of *Taxus* trees. For all these reasons, the growing demand for taxol greatly exceeds the supply that can be sustained by isolation from its natural source and alternative sources of the drug are being sought. In the present study, *in vitro* cell suspension culture of *T. baccata* and *T. brevifolia* has been established and their ability in production of taxol has been compared with their wild mature stocks by HPLC analysis. Callus culture of both species was initiated from nodal segments on B5 [2] medium containing basic salts and 30 g/L sucrose supplemented with different plant hormone regimes [3] with some modification. High percentage of friable callus in both species was also obtained in nodal segments horizontally cultured on B5 medium supplemented with 3 mg L⁻¹ 2,4-D, 0.5 mg L⁻¹ Kin and 0.5 mg L⁻¹ GA. Cell suspension culture was established on the medium supplemented with NAA (2.0 mg L⁻¹) and BAP (0.1 mg L⁻¹) [4]. Taxol content in wild mature stocks and cell suspension cultures of *T. baccata* and *T. brevifolia* was 0.045, 0.027, 0.106 and 0.004 mg g⁻¹ DW, respectively. Our results revealed that *T. baccata* is more potent than *T. brevifolia* for further biotechnological studies in production of anticancer drug taxol.

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**CHEMICAL VARIABILITY IN THE ESSENTIAL OIL CONSTITUENTS
OF *SALVIA HYPOLEUCA*, AN ENDEMIC SPECIES FROM IRAN**

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The genus *Salvia* belongs to the Lamiaceae family and includes more than 900 species worldwide. In the flora of Iran 58 species are reported, of which 17 species are endemic [1]. *Salvia hypoleuca* Benth. is an endemic species of the genus *Salvia* which grows in northern parts of Iran. The aerial flowering parts of 21 populations of *S. hypoleuca* from several geographical regions in north of Iran, Elburz mountain were collected and the essential oils were obtained by hydrodistillation. All studied samples contained essential oils ranging from 0.06% - 0.8% based on dry weight with an average yield of 0.2% w/w. The essential oil composition of the samples was analyzed by GC and GC-MS and identified [2]. A total of 80 components were identified accounting for 82.2-99.6% of volatile constituents in the oil samples. The most predominant constituents were: (*E*)-caryophyllene (3.1-18.3%), bicyclogermacrene (1.7-23.7%) and viridiflorol (0.5-39.3%). Multivariate statistical analysis based on the percentages of the components of the essential oils more than 0.5% was carried out to determine the chemical variation among 21 populations. Cluster analysis resulted in the recognition of two main clusters (chemotypes) based on the discriminant essential oil constituents. Cluster A including three subgroups revealed the 13 populations which were characterized by the highest percentages of bicyclogermacrene (6.8-37.3%), viridiflorol (9.3-37.1%) and (*E*)-caryophyllene (7.1-21.7%). Cluster B including two subgroups composed of eight samples containing α -pinene (19.1-29.3%) and β -pinene (5.7-22.6%) as the main principal constituents. Several chemosystematic aspects of this endemic species are discussed in the light of the essential oil composition data.

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EFFECT PROPAGATION CONDITIONS ON ROOTING OF *ZATARIA MULTIFLORA* WOOD CUTTINGS

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Zataria multiflora Boiss. (Lamiaceae), with the common Persian name of “*Avishan Shirazi*” is an aromatic perennial and woody herb which is widely distributing in Iran, Afghanistan and Pakistan. Aerial parts of plant is rich phenolic compounds, such as thymol, carvacrol and rosmarinic acid. The pharmacological properties of the plant are different including folk as condiment, antiseptic, analgesic, and carminative. The wild population of the plant is growing in arid tropical and semi-tropical regions from the center to the south of Iran. In the present study propagation was carry out throught wood cuttings (5cm) of wild-growing plant which inoculate with different concentrations (500, 1000, 1500 ppm) of indol-3-butyric acid (IBA) and they were cultured on media (sand, peat-lite mixes and U.C mixes). Then they were transferred into propagation structures (cold frame, under ground frame and greenhouse). Rooting percentage and root length was measured in each treatment. The results showed that treatment 1000 ppm IBA, Cold frame and sand medium culture had the greatest effect on traits were measured. Also hormone concentrations and media culture a significant effect on traits were measured. Therefore it is possible that we can propagate it herb with optimization of rooting conditions cuttings.

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A STUDY ON ANTIBACTERIAL PROPERTIES OF *ZATARIA MULTIFLORA* PLANT

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Zataria multiflora Boiss. (Zaatar), is an aromatic perennial shrub belongs to the family of Lamiaceae. The wild population of the plant is growing in arid tropical and semi-tropical regions from the center to the south of Iran. Aerial parts of the plant are rich of phenolics compounds, such as Thymol, Carvacrol and Rosmarinic acid. In this study, antibacterial activities of essential oil and Methanol extracted material of *Zataria multiflora* were evaluated. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the plant materials were assessed against 10 bacterial standard strains by broth micro-dilution method as recommended by CLSI (Clinical laboratory Standard Institute) with some modifications [3]. Chloramphenicol used as standard antibiotic. The lowest recorded MICs for the extract and essential oil were 0.03 and 0.125 mg/ml against *Klebsiella pneumoniae* and *Enterococcus faecalis* strains respectively. However the highest MICs values for the extract and essential oil were 2 and 4 mg/ml against *Pseudomonas aeruginosa*, and *Serratia marcescens* strains respectively. According to the results of this study, *Zataria multiflora* could be considered as a hopeful source against human pathogenic bacteria which some of them could be inhibited by 0.016 and 0.04 mg/ml of Chloramphenicol (for *Klebsiella pneumoniae* and *Enterococcus faecalis* tested strains, respectively). Determination of the effective antibacterial substances of the essential oil and the extract of the plant are underway in our Institute.

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**ORGANIC SAFFRON: ECOLOGICAL WEED MANAGEMENT WITH
APPLICATION OF MUSHROOM BED RESIDUE COMPOST**

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There is a growing concern and demand for healthy food on behalf of both policy makers and the public. Traditional saffron production systems which, in both technical and social terms are forms of ecological production are still operated in many parts of Iran. A return to more sustainable production systems in a country like Iran with a long history of ecological agriculture could be one effective method to protect the fragile local environments. Agronomic practices such as application of organic fertilizers, non-chemical methods for pests and weed control, complete family labour work for production and processing, share-cropping and socio-cultural environment surrounding the whole process of saffron is in compliance with organic farming principles. Alternative treatments in which application of chemical pesticides is at its lowest level have been under increasing consideration. There are various references showing that application of bottom mushroom bed residue compost bring different benefits such as weed reduction, water capacity and soil structure improvements. In order to study the effect of application rate of mushroom bed residue compost on density and biomass of weeds in saffron, a field experiment based on a randomized block design with four replications is under study in the research field unit of Ferdowsi University of Mashhad. Treatments included 0, 15, 30, 45 and 60 t/ha of the compost. Results of first sampling showed a significant effect of compost on weed population and density. Maximum weed control was observed with application of 45 t/ha, however, detailed results of the present study will be available after taking second weed sample and comparing next year saffron yield.

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**EFFECT OF CURCUMIN ON SERUM ENZYME ACTIVITY AND
HISTOLOGICAL CHANGES IN LIVER TISSUE IN
ADRENALECTOMIZED RATS**

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Curcumin is the biologically active compounds that have antioxidant and detoxification is a protective effect on the liver. Subsequent removal of the adrenal glucocorticoids and mineralocorticoids can make changes in the tissues, including the liver. The aim of present study is evaluation histological and histomorphometrical change in liver tissue and serum enzyme activity after adrenalectomy and effect of curcumin on these changes. At this study, 25 femal Wistar rats were divided 5 groups: control, treated with curcumin, adrenalectomised, adrenalectomised treated with curcumin and sham. Bilateral adrenalectomy was carried under anesthesia and muscles and skin were sutured. Curcumin was intraperitoneally administrated 100 mg/kg for 21 days. At the end experiment, levels of functional liver markers (AST, ALT and ALP), albumin and total bilirubin were assessed in the serum. Liver was removed and fixed with formalin-buffer 10% and colored with Hemathoxillin-Eosin and examined by light microscope. The number of injured hepatocytes, copper cells was counted and rate of inflammation was evaluated. In adrenalectomized rats, significantly ALP was significantly increased. The administration of curcumin significantly decreased the ALP level. In histological study of liver tissue, the mean of injured hepatocytes was 21.6 ± 0.5 and increased to 52.8 ± 3.5 in adrenalectomized group and this elevation was significant ($P=0.0001$). The mean of copper cells was 5.4 ± 0.27 and increased to 15.8 ± 3.2 in adrenalectomized group and this elevation was significant ($P=0.0001$). The number of these cells and liver changes was significantly decreased by curcumin. The curcumin can improve liver changes after adrenalectomy.



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**PREPARATION OF HUMAN SERUM ALBUMIN NANOPARTICLES
FOR NATURAL COMPOUND DELIVERY**

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Human serum albumin (HSA) has been extensively used for delivery of low soluble natural compounds, like paclitaxel. This report demonstrates the fabrication and characterization of sonochemically prepared human serum albumin (HSA) for paclitaxel nanodelivery [1]. In this study, HSA nanoparticles were prepared using different techniques including desolvation and ultrasonication [1]. Prepared nanoparticles had a mean size of 223 nm with a narrow size distribution. The need to use chemical cross linker like formaldehyde can be removed using other preparation techniques like ultrasonication [2]. The absence of crosslinking chemicals and emulsifiers in the production of these nanocapsules and nanoparticles also provides an advantage from the economical point of view. The preparation of paclitaxel-loaded HSA nanoparticle using these advances will be reported in this paper. The effect of different parameters like as drug concentration, HSA concentration and sonication conditions on the particle size and size distribution, drug loading and encapsulation efficiency will be reported [2- 4].

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INVESTIGATION OF ANTI HELICOBACTER PYLORI ACTIVITY OF
FOUR IRANIAN MEDICINAL PLANTS

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Helicobacter pylori a gram negative microaerophilic bacillus is the most significant source for peptic ulcer, chronic gastritis and other stomach diseases. The majority of the people in undeveloped and developing countries are suffering from this microorganism. *Cuminum cyminum*, *Mentha longifolia*, *Rosmarinus officinalis* and *Zingiber officinalis* are used traditionally for gastrointestinal disorders in different parts of Iran. The aim of this study was to investigate the in vitro antibacterial activity of 4 medicinal plants against 10 clinical and 1 standard strains of *H.pylori*. Also in order to optimize the antibacterial effect, the combination of these essential oils was investigated. Our preliminary results showed that *Cuminum cyminum* with the inhibition zone of 16 mm had the best antibacterial activity followed by *Z. officinalis* (12.5 mm), *M. longifolia* (12.25), *R. officinalis* (10.5 mm). A number of clinical strains are under consideration to conclude about the effective medicinal plants and probable mechanisms of action. Urease inhibitory activity as a possible route of bactericidal mechanism will be investigated.

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EFFECTS OF *ROSMARINUS OFFICINALIS* AND *PEGANUME HARMALA* ON ISOLATED RAT PANCREATIC ISLETS

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In order to offer hope of cure for diabetes, in the present study, effects of extracts of *Rosmarinus officinalis* and *Peganume harmala* were examined in the function of isolated rat pancreatic islets. Islets were isolated and exposed to different doses of plant extractions in 0.1, 1 and 10 μ M concentrations for 24 hours. Then rate of insulin secretion was tested and also ROS and cells viability were measured by use of fluorometric methods and MTT. Dose of 10 μ M for *Rosmarinus officinalis* and *Peganume harmala* increased stimulation level of insulin secretion and reduced reactive oxygen species (ROS). No effect was observed on the viability of the cells in different doses. All doses of two extracts are safe and positive in improvement of insulin secretion from isolated islets.

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COMPARATIVE ANATOMICAL STUDY OF THE STEM IN
DRACOCEPHALUM SPECIES (LAMIACEAE) IN IRAN

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The genus *Dracocephalum* L. with Persian name of Badrashbi or Badranjbouyeh is belonging to Lamiaceae. The members of the genus are well known as medicinal plant with several uses e.g., anti-hyperlipidemic, analgesic, anti asthma, antimicrobial, antioxidant and anticancer. The genus is represented in flora of Iran by eight species which mainly grows in the rocky mountain areas [1-2]. In this research, stem anatomy of 10 populations of the genus were investigated in order to evaluate the usefulness of this feature for taxonomic purpose. Stem anatomy of all studied samples clearly resembles that of Lamiaceae. Some anatomical characters such as: number of parenchymatous cortex and collenchymatous layers, number and location of vessels, presence or absence of pricyclic fibers, presence or absence of endodermis and hypoderm and ratio of stele to cortex was used as comparative features. Two types of glandular trichomes i.e., capitate and peltate are determined. Capitate trichomes comprise either a unicellular head and uni- or bicellular stalk, or a bicellular head and unicellular stalk. The bicellular head and unicellular stalked capitate trichome was found to be common in all taxa that could be considered as the generic characteristic. The absence of peltate glandular trichome in *D. thymiflorum* was characterized as specific distinguishing character which is present in the remaining taxa. Several systematic aspects of the genus are discussed in the light of the anatomical data.

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**EXTRACTION OF GLYCYRRHIZIC ACID FROM LICORICE ROOT
USING ULTRASONIC TECHNIQUE**

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Glycyrrhiza glabra (licorice) has been used traditionally in treatment of peptic ulcers, asthma, pharyngitis, malaria, abdominal pain, insomnia, infections. Glycyrrhizic acid (GA) is the major active component of licorice. It is known to have anti-inflammation, anti-ulcer, anti-hepatotoxic and antiviral activities [1, 2]. In this study aqueous extract of *Glycyrrhiza glabra* were prepared using sonication technique. Our result showed that the extraction efficiency with regard to GA can be increased up to 16% and GA purity up to 26%. Various process parameters such as extraction time, solvent to solute ratio and ultrasound amplitude which affect the extraction yield are optimized. The yield obtained with ultrasound assisted extraction (UAE) is compared with that of stirring extraction of GA. It is observed that the ultrasound assisted extraction not only gives higher yield but also reduces the extraction time as compared to conventional method.

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NANOEMULSIFICATION OF *THYMUS DAENENSIS* ESSENTIAL OIL

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Essential oils as a major active component of medicinal plants suffer from low solubility in the aqueous phase, which results in a reduced access to the respiratory tract pathogens. Nanoemulsification of bioactive compounds represents a viable and efficient approach to increasing the physical stability of the active substances and because of the subcellular size, increasing their bioactivity [1]. *Thymus daenensis* is a native plant from Iran. It grows in different regions of Iran, in this study we used plants in Ilam areas. *Thymus daenensis* produces high percentage of thymol as a major component of essential oil. Thyme oil has been shown to have inhibitory activities against various bacteria and yeasts. Thymol, the major component of thyme oil, has also been shown to exhibit antimicrobial activity against several bacteria and fungi [2]. In this work, thyme oil-in-water nanoemulsions were prepared using different formulation conditions and additives, then characterized their particle size and size distribution. The results showed that mean particle size can be designed to be in a different sizes from 69.1 ± 1.05 nm to 259.5 ± 14.7 nm. The size distribution varied from 8.1 ± 0.1 to 73.25 ± 62.25 .

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**ESTIMATION OF RADIATION USE EFFICIENCY IN FENUGREEK
(*TRIGONELLA FOENUM-GRÆCUM* L.) UNDER DIFFERENT
TREATMENTS OF ANIMAL MANURE**

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Radiation use efficiency (RUE) plays an important role in ecological systems. It is a useful parameter in studying crop productivity. In order to estimate the RUE in Fenugreek under different treatments of animal manure, a randomized complete block design with three replications was conducted at the farm of the Faculty of Agriculture, Ferdowsi University of Mashhad. Treatments were of four level of animal manure 15,20,25,30 ton ha⁻¹. Results showed that highest dry matter accumulation and leaf area index were obtained in 25 ton ha⁻¹ animal manure. The estimated RUE was 1.55 and 1.72 gMJ⁻¹ in treatments of 15 and 25 ton ha⁻¹ animal manure, respectively.

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LEAF AREA INDEX SIMULATION OF FENUGREEK (*TRIGONELLA FOENUM-GRÆCUM* L.) UNDER OPTIMUM CONDITION IN MASHHAD

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An accurate estimation of leaf area index (LAI) plays a key role in agronomical and physiological studies. The main objective of this study was simulation of Fenugreek LAI which was determined as a function of cumulative temperature from emergence. Local field experimental data were used to verify the LAI, collected from the research farm of Ferdowsi University of Mashhad. The model used crop data and meteorological data including daily maximum and minimum air temperature (°C). Comparison of observed and simulated values was performed to evaluate the model by Root Mean Squared Error (RMSE). The simulation results showed that model satisfactorily predicted leaf area index of Fenugreek with 50 datasets. In general, a significant correlation ($R^2 = 0.84$, $P < 0.01$) obtained between observed and simulated values of LAI. Simulation accuracy of LAI was good with RMSE of 19.3%.

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LEAF AREA ESTIMATION OF SUMMER SAVORY (*SATUREJA HORTENSIS* L.) BY TOTAL DRY WEIGHT EQUATION IN DIFFERENT PLANT DENSITY

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Summer savory (*Satureja hortensis* L.) belongs to lamiaceae family that is one of the most pleasant spices. Leaf area measurement is difficult in medicinal and aromatic plants with small leaves such as summer savory. The aim of this study was to estimate leaf area (LA) by using total dry weight (TDW), specific leaf weight (SLW) and leaf weight ratio (LWR) of summer savory. For this purpose, an experiment was conducted in the Agricultural Research Station of Ferdowsi University of Mashhad. Plant samples were collected from the experimental area at different time intervals in cropping of summer savory with 27, 40 and 80 plants m⁻². DW and LA were measured during different periods in various plant densities. The estimated LA was developed and validated with measured LA. Regression analyses of estimated LA versus measured LA in different plant density showed that proposed equation ($LA = TDW * LWR / SLW$) provided accurate estimate of summer savory leaf area. R-squared values were 0.97, 0.98 and 0.99 in 27, 40 and 80 plants m⁻², respectively. Validation of the regression model showed that the correlation between measured and estimated values by the use of this equation was significant.

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**EFFECT OF PLANT DENSITY ON RADIATION INTERCEPTION AND
USE EFFICIENCY OF SUMMER SAVORY (*SATUREJA HORTENSIS* L.)**

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Efficient use of radiation for medicinal plants production, might increase flower yield, essential oils and extract yield. In order to evaluate radiation absorption and use efficiency in summer savory (*Satureja hortensis* L.), an experiment was conducted in the Agricultural Research Station of Ferdowsi University of Mashhad. The levels of density of summer savory were 27, 40 and 80 plants m⁻². For this purpose a complete randomized block design with 4 replications was used. Results indicated that the most radiation use efficiency obtained at cropping of summer savory with 27 plants.m⁻² density treatment (1.58 g MJ⁻¹). These indices decreased by increasing plant density. Average of summer savory radiation use efficiency was from 1.28 g MJ⁻¹ to 1.58 g MJ⁻¹.

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**IN VIVO SPAWN PRODUCTION OF WILD AND DOMESTIC WHITE
BUTTON MUSHROOM (*AGARICUS BISPORUS*)**

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Today, we can make mushroom producer confident about consumed spawn in terms of purity, qualitative and quantitative characteristics via tissue culture methods. Since there is no information related to mycelium and spawn production via tissue culture so an experiment was carried out to attain the best medium and explants (with low contamination), identification of disinfection treatment and production of the highest mycelium percentage in *in vivo* conditions. To this purposes, explants were collected from spore, cap, ring and stalk of wild (native of Boshehr region) and domestic *Agaricus Bisporus*. In addition, effect of light was studied on mycelium growth. After purifying, myceliums were transferred to new bed prepared with processed wheat and then effect of temperature was assayed on mycelium growth. The results showed that PDA basal medium was better than other mediums whether in wild or domestic mushrooms. In addition, there was the lowest contamination when explants were collected from stalk and cap of wild and domestic mushrooms, respectively. The highest contamination was observed when explants were collected from spores of both types of mushroom. Moreover, the best disinfection treatment was 70% ethanol for 30 s. The highest and lowest mycelium growth percentage was obtained from cap and spore explants, respectively. Furthermore, darkness increased mycelium growth and the best growth was observed when myceliums were incubated at 20 C.

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**THE EFFECT OF DIFFERENT CONCENTRATIONS OF BA AND 2, 4 –D
ON TISSUE CULTURE OF NEEM (*AZADIRACHTA INDICA* L.)**

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Neem is one of the important medicinal plants in tropical regions of Iran. Whereas, Neem produces few seeds and its vegetative reproduction by the cutting and grafting is difficult and is not economical. But we can use plant tissue culture as a suitable method for reproduction of this plant. Therefore this experiment was carried out for determination of the best disinfectant treatment in different explants of Neem (leaf, vein and bud) and achievement to highest percent of callus from leaf explants in Persian Gulf University, Boushehr during 2011-2012. Leaf explants were obtained after sterilization with the best disinfectant treatment and were cultured on MS medium with the different BA concentrations (0, 0.1, 0.5 and 1 mg/lit) and 2, 4-D (0, 0.1, 0.5 and 1 mgr/lit) and also their combination. The result showed that for disinfectant of vein, Leaf and bud explants, Clorox 20% for 10, 20 and 20 minutes were the best treatments, respectively. The highest percentage of leaf callus was in MS medium containing 2, 4-D and BA with 0.1 and 0.5 mg/lit concentrations, respectively.

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**441 VARIABILITY OF ESSENTIAL OIL CONTENT AND
MORPHOLOGICAL TRAITS OF WILD MYRTEL (*MYRTUS
COMMUNIS*) POPULATIONS IN IRAN**

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Essential oil from leaves, flowers, and fruit of *Myrtus communis* L. (Myrtaceae), an evergreen shrub, is widely used in pharmaceutical and cosmetic industries. In this investigation variability of oil content and 16 quantitative and qualitative morphological characteristics such as leaf length and width, stem length, internodes length, stem diameter, etc. of different individual plants of Bushehr, Fars, Kerman, Yasooj, Khorassan and Baluchestan populations were evaluated. Cluster analysis, principal component analysis (PCA) and simple correlation analysis were performed based on morphological data using SPSS software. Essential oil content was varied from 0.84% in Tanghe-Khas to 1.93% in Khash. Cluster analysis, at similarity coefficient of 0.18, divided individuals into three main groups. Results of simple correlation revealed significant correlations among some important characters. Essential oil content showed positive correlation with leaf length (0.627), internodes length (0.516). PCA showed that the first eight PC explained about 82% of the variation which were related to internodes length, leaf length and width, stem length, petiole length and stem diameter.

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**RELATIONSHIP OF STOMATAL LENGTH AND FREQUENCY WITH
PLOIDY LEVEL IN *Satureja* SPECIES (LAMIACEAE)**

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To determine the ploidy level in plants, there are several methods including chromosomes counting in root meristem cells, flow cytometry and molecular markers. Microscopic evaluation of stomatal density, length and width the stomata are one of the best and easiest methods to identify diploid and polyploid plants. The stomata of 8 species *Satureja*, were investigated. Ploidy levels of the species were studied with the method of chromosome counting. Samples were taken from bottom surface of the epidermis of mature leaves using the Neil varnish technique. Samples were colored with logol solution, then microscopic slides were prepared and photographed. Evaluation of stomata density (per square millimeter of the sample, magnification 40x) and the stomata dimensions (length and width) based on micrometer (magnification 100x) were performed. The results showed that *S. khuzistanica* had the highest and *S. hortensis* has the lowest number of stomata. *S. hortensis* and *S. rechingeri* had maximum and minimum stomata length, respectively. Also *S. hortensis* had maximum width while *S. khuzistanica* had the minimum stomata width. In all studied species, with increasing of ploidy levels stomata frequency decreased (number per square millimeter), but the length of stomata cells (microns) increased. A strong negative relationship was observed between stomata frequency and ploidy levels and a positive and strong relationship between stomata size and ploidy levels. Based on our results, stomatal characteristics can be used as an indirect method to determine the ploidy level of the *Satureja* species.

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**VARIABILITY OF AGRO-MORPHOLOGICAL TRAITS AND OIL
CONTENT AMONG IRANIAN *ARTEMISIA DRACUNCULUS* L.)
ACCESSIONS**

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Twenty different accessions of Tarragon, *Artemisia dracunculus* L., were provided from local gardeners in different parts of Iran and were planted in the same environment in order to study the variability of agro-morphological traits and essential oil content. Significant variation was observed among accessions for all the investigated traits. Plant height was varied from 40 to 60.5 cm. Fresh weight and dry weights of the accessions varied between 100 to 400 and 21 to 98 g/plant, respectively. Leaf yield varied from 13 to 55 g/plant among the accessions. The oil content varied between 0.9 to 2.2 %. Due to the uniformity of cultivation and climatic conditions, variation of studied traits is related to genetic factors. Further molecular investigation would be useful to determine the genetic relationships of studied accessions.

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THE EFFECTT OF DRYING METHOD ON THE ESSENTIAL OIL
YIELD AND CARVACROL CONTENT OF *SATUREJA KHUZISTANICA*
JAMZAD AND *SATUREJA RECHINGERI* JAMZAD

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The objective of this study was to investigate the effect of drying treatments on the essential oil yield and carvacrol content of two *Satureja* species i.e. *S. khuzistanica* and *S. rechingeri* for incorporation into a post harvesting program for medicinal and food industries. The drying methods tested were sun-drying (SD, 72 h under sunlight), sun\shade-drying (SSD, 24h under sunlight and 48 h under shade condition in a closed place), open shade-drying (OSD, 72 h under shade condition in an open place with following air), closed shade-drying (CSD, 72 h under shade condition in a closed place) and hot air-drying (HAD, 48 h treated with warm air at 40° C). The essential oil yield (w/w %) in different drying methods for the aerial parts of *S. rechingeri* was in the order of: CSD (3.0%)> SSD (2.9%)> SD (2.7%)> OSD (2.5%)> HAD (1.3%). The essential oil yield of the aerial parts of *S. khuzistanica* were achieved 3.1, 2.9, 2.5, 2.3 and 0.8 (w/w %) in SSD, CSD, SD, OSD and HAD, respectively. The highest percentage of carvacrol (94.46%) was identified in the essential oil of *S. khuzistanica* that was dried in OSD method while, maximum content of carvacrol (92.75%) in the essential oil of *S. rechingeri* was quantified in SD method.

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ROSMARINIC ACID CONTENT AND *IN VITRO* ANTIBACTERIAL
ACTIVITY OF THE METHANOLIC EXTRACT OF ENDEMIC
SATUREJA SPECIES GROWING IN IRAN

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Rosmarinic acid (RA) is a well known valuable phenolic compound because of its wide spectrum of biological activities such as antimicrobial, anti-inflammatory, antimutagenic, improvement of cognitive performance, prevention of the development of Alzheimer's disease, cardioprotective effects, reduction of the severity of kidney diseases, antioxidant and cancer chemoprevention [1]. The objective of this study was to investigate RA content and *in vitro* antibacterial and antioxidant activity of the methanolic extract of four endemic *Satureja* species (*S. sahendica*, *S. atropatana*, *S. edmondi* and *S. bachtiarica*) growing in Iran. The aerial parts of the plants were collected at flowering stage and their RA content were analyzed by HPLC. Our results revealed that the concentration of RA ranged from 3.38±0.43 to 75.66±0.65 mg/100g DW in *S. sahendica* and *S. bachtiarica*. *In vitro* antibacterial of the methanolic extracts of all species were evaluated by determination of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against 4 bacterial standard strains by using broth micro-dilution method as recommended by CLSI (Clinical laboratory Standard Institute) [2]. Chloramphenicol was used as standard antibiotic. The lowest recorded MICs were 0.06 and 0.5 mg/ml for *S. bachtiarica* and *S. edmondi* respectively against *Bacillus cereus* strain. However the highest MICs values were 16 mg/ml against *Escherichia coli* strain. According to the results of MICs and MBCs it was concluded that *S. bachtiarica* had the most effective *in vitro* antibacterial effects and *B. cereus* and *E. coli* were the most susceptible and resistant bacteria, respectively. These results could support the suggestion of Iranian *Satureja* species as a source of antimicrobial ingredients for the food industry.

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**MORPHOLOGICAL DIVERSITY AMONG WILD POPULATIONS OF
SALVIA MIRZAYANII (LAMIACEAE) IN IRAN**

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Salvia is one of the most important genus of the family Lamiaceae. Several *Salvia* species have been shown to possess a significant array of biological and pharmacological properties such as antiseptics, astringents and spasmolytics [1]. This genus is represented in Iran by 58 species of which 17 as *S. mirzayanii* Rech. f. & Esfand. is endemic [2]. *S. mirzayanii* with the common Persian name of *Moortalkh* is growing in Iran, especially in Fars and Hormozgan Provinces [3]. In the present study, morphological diversity among eighteen individuals of six wild populations of *S. mirzayanii* was studied for determining valuable characteristics for future breeding programs and medicinal purposes. 20 quantitative and qualitative characteristics such as length and width of leaf, number of nodes, Length of internodes, length of internodes of inflorescence and inflorescence, length of stamen and pistil, length and width of bract and etc. were evaluated. Cluster analysis at similarity coefficient distance of about 25 divided 18 individuals in two main groups. The main groups consisted of 14 and 4 individuals, respectively. Principal component analysis (PCA) explained about 81% of the variation related to main effective characters such as leaf and inflorescence length, leaf width, number of node and internode length.

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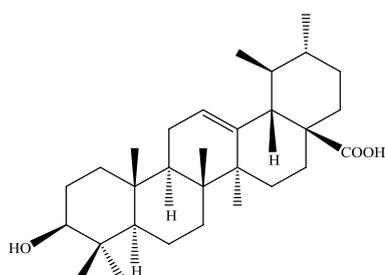
PHYTOCHEMICAL INVESTIGATION ON *NEPETA DENUDATE* BENTH. AND STUDY OF THE BIOLOGICAL ACTIVITIES OF ITS COMPONENTS

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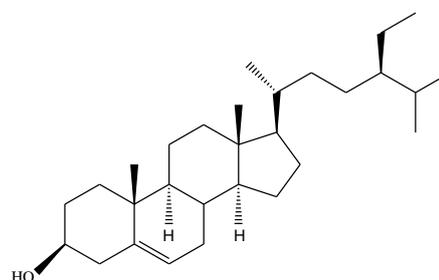
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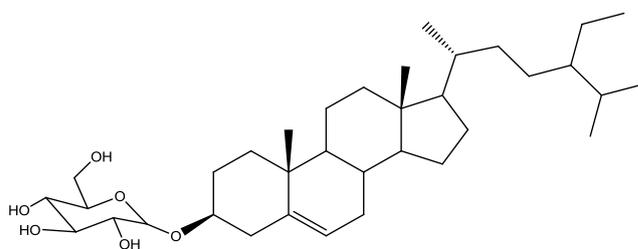
Nepeta denudata Benth. from the labiateae family is one of the endemic plants of Iran. This plant showed significant anti-cancer properties on a number of cancer cell lines, including breast cancer, liver cancer and leukemia. Therefore, the plant was selected for phytochemical investigation to identify the active compounds. Four compounds from its ethyl acetate extract were isolated and purified by column and thin layer chromatography. Finally the structures of pure compounds were fully characterized by 1D (¹H and ¹³C) and 2D-NMR. These compounds were β -sitosterol (a sterol), ursolic acid (an ursane type triterpene), daucosterol (a glucoside sterol) and an ursane type triterpene (**1**) that was isolated and characterized here for the first time from the genus *Nepeta*. Cytotoxic activity of the fractions and the pure compounds were studied on breast cancer cell line (MDA-MB-231) by MTT assay and medium activities were observed.



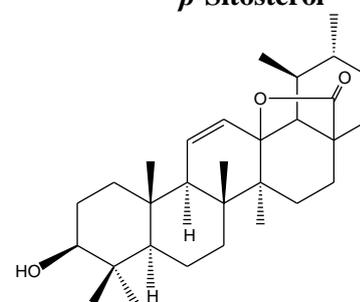
Ursolic acid



β -Sitosterol



Daucosterol



1



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MICROPROPAGATION OF LEMON VERBENA (*LIPPIACITRIODORA*)

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Medicinal plants are well-known natural sources of remedies for the treatment of various diseases since antiquity. According to a report by world health organization (WHO), nearly 20,000 plant species are currently being used for medicinal purposes. Plant propagation by tissue culture is a useful mean to overcome difficulties of plant propagation by seeds allowing exponential propagation rates [3]. *Lippia citrodora* is a perennial plant and belongs to verbenaceae family. Sedative and antibacterial effects are properties of this herb. This plant has antioxidant, antimicrobial and antitumor properties due to phenolic compounds (flavonoids and phenolic acids) and terpenoids. The leaves are very aromatic and have frequently applied as a tea. This plant has several essential oil and its main components include cineol, Neral and Limonen [1, 2]. Based on the medicinal importance of *Lippia citrodora*, the study was performed to propagate by tissue culture. In this experiment, tissue culture of *Lippia citrodora* with two type of explants (node and shoot tip) and 16 hormonal combination (consist of 0, 0.1 0.3 and 0.5 NAA mg/l and 0, 1, 2 and 4 BAP mg/l) with four replications was studied. The shoot number, shoot length, node and leaf number, internode length, callus and root formation were measured. The highest growth rate was observed on node explant and medium with 0.3 NAA without BAP. The results showed that hormonal combination of NAA without BAP had a positive effect on Rooting and increase of NAA to 0.3 mg enhanced Rooting and concentrations up to this, caused rooting failure. Also observed that in node explant and hormonal combination of 0.1 mg/l NAA, 1 mg/l BAP were the most effective in shoot product. The maximum length of shoots was observed in treatment containing 0.3 mg NAA or without BAP, 0 mg.

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**ENANTIOSEPARATION OF ATROPINE AND AMMONIUM
GLUFOSINATE BY CELLULOSE TRIS-PHENYLCARBAMAT CHIRAL
STATIONARY PHASE IN ANALYTICAL SCALE**

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Most efficient and common technique for separation and purification of natural chiral compounds, especially in the preparative scale, is HPLC with columns included polysaccharide stationary phases. Polysaccharide stationary phases have high ability to interact enantioselectively with many chiral compounds such as tropane alkaloids (1), flavanoids (2), organophosphorus pesticides (3) etc. Atropine (*dl*-hyoscyamine) that is one of most tropane alkaloids which found in solanaceae is an anticholinergic agent whit therapeutic uses but only (-)-hyoscyamine is responsible for all of his medicinal properties (4,5). On the other hand, ammonium glufosinate is an active ingredient of broad-spectrum systematic non-selective herbicide BASTA[®] that uses to control a wide range of weeds after crop emerges or for total vegetation control on land not used for cultivation (6). This herbicide distributes as a racemic compound while only L-enantiomer has herbicidity by inhibiting L-glutamine synthetase enzyme (7). So, in this work, a cellulose tris-phenylcarbamate stationary phase was made and for the first time, successfully enantiomeric separations of atropine and glufosinate ammonium were done. The results showed that resolution of these compounds could be done in short retention time with purity up to 95%.

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**PURIFICATION, IDENTIFICATION AND BIO ASSAYS STUDIES OF
CYCLIC PEPTIDES FROM *VIOLA IGNOBILIS***

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Cyclotides are a unique class of cysteine-rich macrocyclic mini-protein. These peptides have about 27-32 amino acids in size and a head-to-tail cyclized backbone with three disulfide bonds in a knotted arrangement referred to as cyclic cysteine knot (CCK) motif [1]. Their knotted structure makes them exceptionally stable against thermal chemical and enzymatic degradation. Interest in these macrocyclic peptides derives from their unique topology, their diverse range of biological activities have uterotonic, anti-microbial, insecticidal, anti-HIV, anti-cancer and other activities [2]. In our previous study, identification of new cyclotides namely vigno 1-10 from *viola ignobilis* plants have done. In some case, there two cyclotides with same retention time on HPLC due to similarity of amino acids sequence and same hydrophobic and hydrophilic patch on their structures [3]. So studies of their biological activities without any separation were impossible. In this work, we tried to separate this co-elute cyclotides by developing chromatography methods. Therefore to achieve this purpose, we applied different gradient and isocratic elution methods on both C8 and C18 columns. After obtaining good resolution in analytical scale chromatography and liquid chromatography-mass spectrometry analysis (LC-MS), collecting isolated cyclotides by preparative HPLC based on developed methods was performed. The biological activity assays has been started to measure. The primary obtained results showed that these compounds have considerable biological activities on some cancer cell-line and bacteria.

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**EXTRACTION AND CHARACTERIZATION OF SPHERICAL SILICA
GEL FROM RICE HUSK ASH**

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Rice husk is an agricultural residue abundantly available in the rice producing countries. Silica is the major constituent of rice husk ash. Last experiments have been carried out successfully under lab scale to extract the silica from the rice husk ash [1, 2]. Over the past decade porous silica has become the most important and widely used packing material in column liquid chromatography [3, 4]. In the high performance liquid chromatography (HPLC), the primary objective is to attain a column bed as a uniform, dense and stable array of microparticles in order to minimize band broadening and obtain a reasonable pressure drop. Solid silica species can be classified on the basis of four main features: crystal structure, dispersity, surface composition and porosity. The pore system can be characterized by the width of the pores, their shapes and their distribution within the solid particles. The silica used in HPLC, for HPLC the silica particles not only must have essential features such as high surface area, porosity and stability but also must be small spherical particles. As a result of a series of studies, 3-10 μm particles have been found to be optimal as packings with respect to column efficiency and practical use. It is an object of our experiment to provide an economical process for producing spherical silica gel in a simple manner for HPLC column. Powdery spherical silica gel was successfully produced by a series of chemical experiments. The crystal structure, dispersity, surface composition and porosity of obtained silica have been analyzed by X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray and transmission electron microscopy (TEM), respectively. These features as mentioned above provide this silica powder as convenience silica using in HPLC.

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THE STUDY OF ALLELOPATHY PROPERTIES OF *ARTEMISIA DRACUNCULUS* AND *ARTEMISIA ANNUA* ON PROLINE CONTENT AND GERMINATION PERCENT OF TWO CROP SPECIES

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Artemisia is one of the most important genres of Asteraceae family. This genus is industrially important due to its insecticidal, antifungal, antibacterial, allelopathic and other properties [1]. *A. dracunculus* (Targon) and *A. annua* have been used for this study because of their allelochemical production that effects on germination, and proline metabolism of own and other species. An experiment was set up using two treated crop species, wheat (*Triticumaestivum*) and canola (*brassica napus*) with crude extract obtained from two mentioned *Artemisia* species at three concentrations 2.5, 5 and 7.5 % at vegetable and reproductive stages in two forms: autoclaved form (group A) and non-autoclaved form (group B) for measurement of proline metabolism as an indicator of stress caused by allelopathy according to protocol [2]. This study was followed by essential oil GC-MS analysis of two above *Artemisia* species at vegetative and reproductive stages and also the germination percents of those treated crop species under allelopathy effect of two *Artemisia* species. The results showed that by increasing concentration of *A. dracunculus* and *A. annua* extracts of both A and N groups at vegetable stages, the proline content in treated wheat and canola was raised, but wheat showed highest proline content at concentration 5%. The extract obtained from *A. annua* at reproductive stage of both groups A and N slightly effect on proline content of wheat and canola. Germination percent was reduced by increasing extract concentrations except extract of *A. dracunculus* at 5% concentration group N on wheat and at 7.5% concentration group A on canola showed highest percent germination but extracts of *A. annua* at 100% concentration group N and 50% concentration group A showed highest germination percent of wheat to compare with others. Essential oil GC-MS analysis of both *Artemisia* species at two stages (vegetative and reproductive) showed 28 similar components. *A. dracunculus* possess 10 out of 28 components at vegetative stage and *A. annua* 25 out of 28 components at vegetable stage and 27 out of 28 components at reproductive stages respectively. The percent of compounds at reproductive stage of *A. annua* compare to its vegetable stages was significant low. Based on our knowledge the results of germination percent and proline content of two treated crop species confirmed the GC-MS analysis.

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**FAST AND SIMPLE EXTRACTION OF PESTICIDE RESIDUES IN
MEDICAL PLANTS**

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Pesticides, such as insecticides, herbicides, fungicides and acaricides, have been widely applied during the cultivation and the post-harvest storage of crops. Their use is intended to prevent the destruction of edible crops by controlling agricultural pests or unwanted plants and thereby improve food production. Although the use of pesticides in agricultural applications provides a wide range of beneficial effects, their inappropriate use can result in unacceptably high levels of compounds in the products that could reach the consumers directly or indirectly. The extensive use of pesticides has been a concern because of their potential harm to the environment and known or suspected toxic effects in humans, such as acute neurological toxicity, neuro developmental impairment, possible dysfunction of the immune, reproductive and endocrine systems, cancer, chronic kidney diseases and other potential diseases. Due to these concerns, the monitoring of pesticide residues in food products, especially in raw plants (such as medical plants), must be pursued. Pesticides were extracted from each homogenized sample after thawing to room temperature, using a procedure entailing the following steps: 10 g of sample were weighed in a glass volumetric extraction vessel and 1.0 mL of toluene was added. The system apparatus was constructed and operated by a vacuum pump. Under the vacuum (100 mbar), 15 ml of 1, 1, 1, 2-TFE were added to the extractor by using the scale of the extractor. After addition of 15 mL of 1, 1, 1, 2-TFE to the extraction vessel from the solvent tank, the valves connecting the tank to the extraction vessel were closed. The vessel was vortexed thoroughly for 2 min, and the organic phase (1, 1, 1, 2-TFE and toluene) was drained into a beaker. After 1, 1, 1, 2-TFE was evaporated, the remaining toluene phase was transferred to a vial and injected to LC/MS.

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THE EFFECT OF (-)-EPIGALLOCATECHIN-3-GALLATE ON THE VIABILITY OF RAT BONE MARRO MESENCHYMAL STEM CELL TREATED WITH BISPHENOL A (BPA) IN VITRO

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Bisphenol A (BPA), known to be a xenoestrogen, is widely used in industry and dentistry. In addition to environmental problems, also can be harmful to human health. Epigallocatechin-3-gallate (EGCG) is a major compound of green tea polyphenol that has shown antioxidant properties. This study investigated the effect of Epigallocatechin gallate as an antioxidant on the viability of the rat bone marrow mesenchymal stem cells treated with bisphenol A (BPA). In this experimental study, rat bone marrow mesenchymal stem cells were extracted in DMEM containing 15% FBS and Pen/Strep up to third passage and then, cells were divided to 6 groups: control, bisphenol A (50 μ M and 150 μ M), EGCG (50 μ M), bisphenol A(50 μ M)+EGCG and bisphenol A (150 μ M)+EGCG for a period of 3 day. The cell viability was measured using MTT assay. Data were analyzed using one way ANOVA and means differences was considered significant at $P<0.05$. One way ANOVA indicated a significant difference in the viability of the cells in dose(50 μ M) of bisphenol A. A significant increase in the viability was found in the group of Bisphenol A (50 μ M) + EGCG to the control group [1, 2].

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THE EFFECT OF VITAMINE E ON THE VIABILITY OF RAT BONE MARROW MESENCHYMAL STEM CELL TREATED WITH BISPHENOL A (BPA) IN VITRO: A SHORT TERM STUDY

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Bisphenol A (BPA) is widely used in industry and dentistry and is one of the most common environmental endocrine disruptors. In addition to environmental problems, also can be harmful to human health. Vitamine E is a major antioxidant in biological systems, acting as a powerful chain-breaking agent through the scavenging of peroxy radicals. This study investigated the effect of Vitamine E as an antioxidant on the viability of the rat bone marrow mesenchymal stem cells treated with bisphenol A (BPA). In this experimental study, rat bone marrow mesenchymal stem cells were extracted in DMEM containing 15% FBS and Pen/Strep up to third passage and then, cells were divided to 6 groups: control, bisphenol A (50 μ M and 150 μ M), Vitamine E (25 μ M), bisphenol A(50 μ M)+ Vitamine E and bisphenol A (150 μ M)+ Vitamine E for a period of 3 day. The cell viability was measured using MTT assay. Data were analyzed using one way ANOVA and means differences was considered significant at $P<0.05$. The results indicated a significant difference in the viability of the cells in 50 μ M of bisphenol A. A significant increase in the viability was found in the group of Bisphenol A (50 μ M) + Vitamine E (25 μ M) compared to the control group [1, 2].

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**EVALUATION OF ANTI-VIRAL EFFECTS OF *THYMUS VULGARIS* L.
EXTRACT AGAINST OF HERPES SIMPLEX VIRUS TYPE 1 ON
HUMAN CELL CULTURE**

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Herpes simplex virus type 1 (HSV-1) cause gingivostomatitis, meningoencephalitis, oropharyngeal and neonatal herpes diseases in human. Several anti-viral drugs have approved effective against HSV-1 infection, like Acyclovir, may suppress clinical manifestations, but have many side-effects. The herbals drugs have lower side-effects so in this study was evaluated anti-viral effects of *Thymus vulgaris* L. extract against of HSV-1 on Hela Cell line. HSV-1 was cultured on Hela cell line which is origin of human cells. Toxicity of *Thymus vulgaris* L. on Hela cells was evaluated by Trypan blue method and MTT assay. Anti-viral effect of *Thymus vulgaris* extract on virus replication was evaluated on different concentrations and different times. Virus titer was determined by TCID₅₀ method. The obtained shows nontoxicity effect on Hela cell line in 0.3 µg/ml concentration of *Thymus vulgaris* L.. This concentration shows inhibitory effect on HSV-1 replication after 2 hours of adsorption, Such that titer of the virus from 10^{5.3} in medium without extract reduced to the 10^{3.3} in medium contained extracts. In accordance with results, it can be educed that anti-viral herbal substances inflict virus by interference on primary genes expression and they can impede virus replication.



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**EVALUATION OF ANTI-VIRAL EFFECTS OF RUTAGRAVEOLENS
L.EXTRACT AGAINST OF HERPES SIMPLEX VIRUS TYPE 1 ON
HUMAN CELL CULTURE**

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Herpes simplex virus type 1 (HSV-1) is specific to human which causes the various disease such as cold sore , meningitis, encephalitis and ocular infections. Chemical drugs such as acyclovir are used to treat infections caused by the virus. Some strains of the virus have been resistant to acyclovir and this drug have too side effects. The use of *Ruta graveolens*.Lherb long been used to treat many infections; the main aim of this study was to determine the antiviral effect of *Ruta graveolens*.L plant extraction the HSV-1 replication. HSV-1 was cultured on Hela cell line, which is origin of human cells. The toxicity range of *Ruta graveolens*.L plant extract was evaluated on Hela cell with Tryp an blue and MTT methods. Antiviral effects of the plant extract on HSV-1 were assessed at different concentrations and different times. Virus titer was determined by TCID50 method. 0.125 µg/ml concentration of *Rutagraveolens*. Lextract waslack of toxicity on Hela cells and this concentration had the highest inhibitory effect on HSV-1 replication. As well as the maximum inhibition effect, of extract was observed at 2 hours after infecting the cells and virus titer was reduced from 10⁶ in medium without the extract to 10^{4.1} in medium contained extract. Due to the results of this study, we can conclude that the active ingredients of plant apply its antiviral effect inside the cell and in early hours of the virus replication.



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**THE EFFECT OF ALPHA-TOCOPHEROL ON BISPHENOL A (BPA)-
INDUCED TOXICITY IN RAT BONE MARROW MESENCHYMAL
STEM CELLS IN VITRO: A LONG TERM STUDY**

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Bisphenol A (BPA), known to be a xenoestrogen, is widely used in dentistry, manufacturing coatings and resins, leach from packaging materials into food. Numerous studies suggested that BPA in addition to environmental problems, also have adverse effects on human health and recognized as an endocrine disruptor. α -tocopherol has been found to have antioxidant and cytoprotective properties in cultured cells but its effect on alleviation of bisphenol A toxicity in bone marrow mesenchymal stem cells has not yet been determined [1, 2]. In this experimental study, rat bone marrow mesenchymal stem cells were extracted and cultured in DMEM containing 15% FBS and Pen/Strep. Cells from third passage were treated with bisphenol A (250 nM and 1000 nM), bisphenol A(250 nM) + α -tocopherol (25, 50, 100, 150 μ M), and bisphenol A(1000 nM) + α -tocopherol (25, 50, 100, 150 μ M), in osteogenic media for a period 21 days. The cell viability and matrix mineralization were measured using MTT test and alizarin red staining, respectively. Data were analyzed using one way ANOVA and means differences was considered significant at $P < 0.05$. The cell treatment with bisphenol A in osteogenic medium was resulted in a significant decrease in cell viability and also bone matrix mineralization. Also cells treated with α -tocopherol(25 μ M) + bisphenol A(250 nM) and α -tocopherol(50 μ M) + bisphenol A(1000 nM) was resulted in a significant rise in cell viability and bone matrix mineralization. Our results show that α -tocopherol exerts a protective effect against bisphenol A toxicity and these changes in the viability and mineralization of the cells was dependent on dose.

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**EFFECT OF GREEN TEA (*CAMELLIA SINENSIS*) EXTRACT ON
SPERM PARAMETERS IN ADULT MALE RATS**

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Green tea extract (GTE) is an antioxidant and free radicals scavenger which has chelating property. This study evaluated the effects of GTE on sperm quality. Adult male Wistar rats (215±20 gr) were gavaged with dissolved GTE in water (200 mg/kg/day) for 56 days. At the end of treatments, the rats and the left testis were weighed. Then left caudal epididymis was placed in Ham's F10 and cut in pieces. Released spermatozoa were used to analyze sperm parameters including sperm number, viability, morphology and motility. Data were analyzed using T-test and means differences was considered significant at P<0.05. Results showed that sperm viability and motility significantly increased in rats treated with GTE compared to control group. In conclusion, this study revealed that GTE has an antioxidant effect on epididymal sperm and thereby improving the sperm quality and function [1-3].

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**EFFECTS OF COPPER AND ZINC ON CHLOROPHYLL CONTENT,
LEAF AREA, BIOMASS AND ESSENTIAL OIL CONTENT IN SAVORY
(*SATUREJA HORTENSIS L.*)**

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Zinc and copper plays an important role in many structural and biochemical functions in plants. However surfeit amounts of these elements as heavy metals is one of the limiting factors for plant's growth. In this study, effects of different concentrations of zinc and copper and their interaction on Savory were studied. The plants were grown in greenhouse for 12 weeks in contaminated soil. In the mentioned soil three levels of copper (0, 5 and 25 mg/Kg CuSO₄) and three levels of zinc (0, 10 and 50 mg/Kg ZnSO₄) in three replication were applied. Results revealed that the highest shoot and root dry weight, leaf area, chlorophyll content and plant height were observed in Cu5 and Zn10. Essential oil was affected by the concentrations of zinc and copper. The highest amount of essential oil (1/1 and 1/09%) and the lowest amount (0/99 and 0/98%) were observed in Cu5, Zn10 and Cu25, Zn50 respectively. Because of the high resistance of Savory to high levels of zinc and copper, low changes in growth indices were observed. Based on the results, copper and zinc at low concentrations stimulate growth however at the high concentrations may cause toxic effects on Savory.



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ESSENTIAL OIL COMPOSITION OF
TANACETUM ABROTANIFOLIUM (ASTERACEAE) FROM IRAN

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The genus *Tanacetum* L. belongs to the family Asteraceae, tribe Anthemideae and subtribe Anthemidinae *sensu* Oberprieler *et al.*, (2007). Within the tribe, *Tanacetum* is the third largest genus after *Artemisia* and *Anthemis*, comprising around 160 species. The genus is widely distributed in Europe, Asia, northern Africa and North America. In the flora Iranica area, this genus was considered to have 54 species and in Iran, comprised 25 species and altogether 34 taxa (Podlech, 1986). In this research, the essential oil composition of *Tanacetum abrotanifolium* from west Azerbaijan province of Iran was investigated for the first time. The essential oil was isolated by hydrodistillation from the aerial flowering parts of plant. The oil was analyzed by GC and GC-MS and identified. Thirty-four compounds were identified representing 97.6% of the total oil. (*E*)-Sesquilandulol (26.6%), camphor (16.2%), 1,8-cineole (12.9%) and α -bisabolol (5.5%) were determined as major compounds.

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**ESSENTIAL OIL COMPOSITION OF *ACORUS CALAMUS* L.
(ACORACEAE) FROM NORTH OF IRAN**

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Acorus calamus L. (Sweet flag) is a wetland perennial monocot plant, in which the scented leaves and rhizomes have been traditionally used medicinally against different ailments like, fever, asthma, bronchitis, and cough and mainly for digestive problems. The species is belonging to the family Acoraceae and has recently been recorded for flora of Iran from Mazandaran province [1]. The essential oil was isolated from the leaves by hydrodistillation, analyzed by GC-MS and identified [2]. Twenty-eight compounds were identified representing 98.9% of the total oil. (*Z*)-Asarone (53.1%) and (*E*)-asarone (6.6%) followed by (*E*)-caryophyllene (6.7%) and acorenone (4.5%) were found to be the principal essential oil compound.

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**CHEMICAL VARIABILITY IN THE ESSENTIAL OIL COMPOSITION
OF FIVE *THYMUS* L. SPECIES IN NORTH OF IRAN**

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The genus *Thymus* L. with the common Persian name of Avishan comprises about 14 species growing wild in Iran [1]. As part of our studies on Iranian essential oil-bearing plants, here we report essential oil compositions of five species namely: *T. migricus*, *T. trautvetteri*, *T. linearis*, *T. fallax* and *T. pubescens*. The oils were isolated from the aerial parts at the full flowering stage by hydrodistillation, analyzed by GC-MS and identified [2]. While, thymol (23.2-93.4%) was found as the major first constituent in all of the studied species, the second main component was turned out to be characteristic in the specific level. In *T. linearis*, the recently reported species from Iran, the least thymol content (23.2%) was observed followed by bornyl formate (18.9%) and 1, 8-cineole (16.9%). The second major component of *T. trautvetteri* was characterized to be α -terpineol (10.9%). In *T. migricus* and *T. fallax*, β -phellandrene (12.3%) and 1, 8-cineole (9.6%) were determined as second principal compounds, respectively. Some chemotaxonomic aspects of the studied species and available oil composition of the *Thymus* species in the literature are discussed in the light of the essential oil composition data.

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**ANALYSIS OF ESSENTIAL OILS FROM INFLORESCENS AND SEEDS
OF *PEUCEDANUM RUTHENICUM* M.B., A PLANT ENDEMIC TO IRAN**

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In the present study, essential oils from inflorescences and seeds of *Peucedanum ruthenicum*, a plant endemic to Iran [1]. Collected from Rasvand, Markazi province, Iran, was subjected to phytochemical analyses by means of GC and GC/MS [2]. Based on the dry weight, inflorescences and seeds yielded 1.16% and 2.06% essential oil (w/w), respectively. According to the results, there were significant differences among the chemical profile of studied essential oils. In the flowerheads essential oil, p-cymene (13.0%), α -pinene (13.7%) and β -pinene (13.3%) were found to be dominant. In contrast, β -merycene (17.7%), α -phellanderene (14.2%), limonene (11.6%), β -pinene (8.4%), sabinene (8.3%) and α -pinene (8.0%) were identified as the major components of the essential oil from seed.

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**EVALUATION ON PERFORMANCE OF *MENTHA PIPERITA* BY
APPLICATION OF ORGANIC AND BIOLOGICAL INPUTS UNDER
ORGANIHUME PLANTING BED**

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In order to investigate the effect of organic inputs on growth, yield and essential oil content of *Mentha piperita* (Lamiaceae), a field experiment was conducted as factorial based on randomized complete block design with three replications at Research Farm of Islamic Azad University of Jiroft in the year 2011. Treatments were organihume as planting bed (without and with 150 kg ha⁻¹) and various organic and biological inputs such as municipal waste compost, cattle manure, mushroom compost, N-fixing bacteria, P solubilizer bacteria and mixture of N-fixing and P solubilizer bacteria. Criteria such as plant height and diameter, number of node, auxiliary stem and leaves per plant, internode length, herbal fresh and dry weight, stem and leaf dry weight and essential oil content were evaluated. Results showed that all measured criteria significantly affected by application of organic and biological inputs. Interaction effect of organihume and organic and biological inputs had significant effect on plant height and diameter and number of node per plant. The highest amount of leaf dry weight and essential oil content observed by using cattle manure in combination with organihume and also non organihume planting bed. Application of N-fixing bacteria with organihume decreased leaf dry weight of *M. piperita* while the lowest amount of essential oil content observed in P solubilizer bacteria without using organihume. In general, based on our results, growth and yield of *M. piperita* performed better under cattle manure application.



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**IN VITRO SHOOT PROLIFERATION OF *MYRTUS COMMUNIS* L.
FROM FIELD-GROWN PLANTS**

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In vitro vegetative propagation of native Iran myrtle (*Myrtus communis* L.) has been obtained from mature field-grown plants. Nodal segment were cultivated on a standard basal medium supplemented with 3% sucrose, 100 mg /L inositol and 0.8% agar. For the proliferation stage various 6-benzylaminopurine treatments (0.2-0 mg /L) and explant orientations were tested. A high proliferation rate was obtained from explants placed horizontally on a medium containing 2.0 mg /l and 0.05 mg/l 1-naphthalene acetic acid (NAA) and subcultured at 5-week intervals. Shoot proliferation medium composition and NAA concentration strongly influenced root induction on propagules.

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**THE FIRST REPORT ON OBSERVATION OF INDOLE 3-BUTYRIC
ACID IN IRANIAN ISOLATES OF CYANOBACTERIA**

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Cyanobacteria or blue-green algae are the largest group of photosynthetic prokaryotes. They are a rich source of potentially bioactive compounds like carotenoids, fatty acids, proteins, polysaccharides, vitamins and phenol compounds which exhibit antioxidant, anti-microbial, anti-inflammatory, hepatoprotective, immunomodulation and anti-cancer activity [1]. The N₂-fixing forms also improve the fertility of natural and cultivated ecosystems [2]. The potential biofertilizer activity of cyanobacteria makes them an attractive alternative to chemical fertilizers. The plant growth promotion effect of three isolates of the gathered cyanobacteria from Iranian paddy soils including *Anabaena vaginicola*, *Nostoc calcicola* and *Hapalosiphon welwitschii* was investigated on some vegetable and herbaceous plants which showed positive growth effect in most measurement factors [3]. The studies show that the nitrogen fixation capability is not the only factor contributing to the growth promoting effect and the existence of several other bioactive chemicals like plant growth regulators (PGRs) also play an important role in this issue. There is still little known about the actual role of auxins in algal lineage [4]. To study the ability of these three isolates in producing auxins, three endogenous auxins including indole 3-acetic acid (IAA), and two of its main homologues, indole 3-propionic acid (IPA) and indole 3-butyric acid (IBA) were extracted and analyzed with high performance liquid chromatography (HPLC) equipped with diode array detector (DAD) and fluorescence detector (FLD) and the results were further confirmed with liquid chromatography–tandem mass spectrometry (LC-MS/MS) in the negative ion mode. The dominant auxin observed in all isolates was IBA in the range of 140.10–2146.96 ng/g fresh weight (FW) and only small amounts of IAA (2.19–9.93 ng/g FW) were detected. This is the first report on the presence and predominance of IBA in cyanobacteria and microalgae which is different from previously reported results with predominance of IAA. It seems that similar to higher plants, IBA may be converted to IAA to maintain the auxin level and it has a possible role as an auxin storage form. The details of the findings would be further discussed in the conference.

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**CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF THREE
TANACETUM SPECIES FROM NORTH-WEST OF IRAN**

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The genus *Tanacetum* is one of the most important medicinal plants that contains 26 species in Iran, 12 of them are endemic. This paper reports the essential oil composition of *Tanacetum angulatum* Willd. *Tanacetum canacens* DC. and *Tanacetum pinnatum* Boiss. growing wild in Iran. Plant flower and leaves were collected from different locations of North- West of Iran. Samples were hydro-distilled to produce the oils in the yields (v/w) of 0.4% for leaves and 0.02% for flowers for both *Tanacetum filipendulia* and *Tanacetum canacens* collected from Azerbaijan province (Tabriz), in of 0.05% for leaves and 0.2% for flowers for *Tanacetum pinnatum* from Zanzan province (Zanzan) Main oil components of *Tanacetum angulatum* Willd. identified by GC/MS for leaves were 1,8-cineole (75.3%), camphor (8.1%) and for flowers were 1,8-cineole (66.0%), camphor (9.0%). For *Tanacetum canacens*, main oil components of leaves were 1, 8-cineole (25.3%), α - calacorene (7.9%) and for flowers were *n*-eicosane (19.7%), α - calacorene (13.3%). Main oil constituents of *Tanacetum pinnatum* leaves were camphor (24.2%), α -calacorene (13.3%), and for flowers were germacrene B (33.0%), *n*-eicosane (10.5%).



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**CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF
TANACETUM POLYCEPHALUM SCHULTZ-BIP. SUBSP
POLYCEPHALUM FROM DIFFERENT LOCATION OF AZARBAEIJAN
PROVINCE IN IRAN**

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The genus *Tanacetum* is one of the most important medicinal plant that contains 26 species in Iran, 12 of them are endemics. This paper reports the essential oil composition of *Tanacetum polycephalum* Schultz-Bip. Subsp *polycephalum* growing wild in Iran, Flower and leaves were collected from different locations of Azarbaijan province (Marand, Mianeh and Tabriz), were hydro-distilled to produce the oils in the yields of leaf 0.3% and flower 0.5% (V/W) from Marand samples and leaf 0.6% and flower 0.4% (V/W) from Mianeh samples and leaf 1.0% and flower 0.04% (V/W) from Tabriz samples, respectively, and analyzed by GC and GC/MS. Main components obtained from Marand for leaf were 1,8-cineole (63.5%), chrysanthenone (5.5%) and for flower were chrysanthenone (39.5%), 1,8-cineole (18.9%), and Mianeh sample for leaf were 1,8-cineole (34.8%), chrysanthenone (16.1%) and for flower were dihydroeudesmol (12%), nootkatin (9.6%), and for Tabriz sample for leaf were camphor (29%), 1,8-cineole (14.3%), and for flower were trans- sabinene hydrate (56.7%), 1,8-cineole (10.7%).



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ISOLATION OF TWO ABIETANE DITERPENOIDS FROM THE ROOT
EXTRACT OF *SALVIA LERIIFOLIA*

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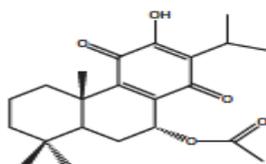
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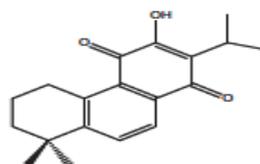
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The genus *Salvia* (sage) belongs to the Lamiaceae and encompasses 900 species. *Salvia* is the largest genus in this family and constitutes almost one quarter of the Lamiaceae. The genus *Salvia* is generally known for its multiple pharmacological effects including anti-inflammatory, antipyretic, antioxidant, hepatoprotective and hypoglycaemic activities. Fifty-eight species of the genus *Salvia* are found in Iran, of which 17 are endemic. *Salvia leriifolia* Benth. is a perennial herbaceous plant that grows exclusively in south and tropical regions of Khorasan and Semnan provinces, Iran. This plant was introduced in Florica Iranica in 1982 and has different vernacular names such as Nuruozak and Jobleh.

Different pharmacological activities of this plant, such as the attenuation of morphine dependence, hypoglycemic, analgesic, and anti-inflammatory activities, and anticonvulsant, antiulcer, and antibacterial effects, were evaluated [1]. In the present work, we have undertaken a phytochemical investigation on hexane extract of the root of *S. leriifolia* and reported the isolation and identification of two abietane diterpenoids (**1**, **2**). Structural elucidation of these compounds was accomplished by extensive spectroscopic methods including 1D and 2D NMR experiments (HSQC, HMBC, COSY). Abietane diterpenoids are a large group of secondary metabolites isolated from many plants. These compounds have attracted interest on account of their biological properties such as tumor inhibitory, antiplatelet aggregation, antituberculostatic and antiviral activities [1].



1



2

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**MORPHOLOGICAL DIVERSITY AMONG WILD POPULATIONS OF
SALVIA MIRZAYANII (LAMIACEAE) IN IRAN**

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Salvia is one of the most important genus of the family Lamiaceae. Several *Salvia* species have been shown to possess a significant array of biological and pharmacological properties such as antiseptics, astringents and spasmolytics [1]. This genus is represented in Iran by 58 species of which 17 as *S. mirzayanii* Rech. f. & Esfand. is endemic [2]. *S. mirzayanii* with the common Persian name of *Moortalkh* is growing in Iran, especially in Fars and Hormozgan Provinces [3]. In the present study, morphological diversity among eighteen individuals of six wild populations of *S. mirzayanii* was studied for determining valuable characteristics for future breeding programs and medicinal purposes. 20 quantitative and qualitative characteristics such as length and width of leaf, number of nodes, Length of internodes, length of internodes of inflorescence and inflorescence, length of stamen and pistil, length and width of bract and etc. were evaluated. Cluster analysis at similarity coefficient distance of about 25 divided 18 individuals in two main groups. The main groups consisted of 14 and 4 individuals, respectively. Principal component analysis (PCA) explained about 81% of the variation related to main effective characters such as leaf and inflorescence length, leaf width, number of node and internode length.

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**SIMULTANEOUS DETERMINATION AND QUANTIFICATION OF
FLAVONOIDS IN 8 IRANIAN SPECIES OF DRACOCEPHALUM BY
HPLC METHOD**

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Dracocephalum is a genus of ca. 60 species of flowering plants in the family Lamiaceae, native to temperate regions of the Northern Hemisphere. Recently, much attention has been paid to *Dracocephalum* genus and its chemical constituents because of their diverse activities, such as antioxidant, antihypoxic and immunomodulatory activities, etc. The species of *Dracocephalum* belong into the groups of those plants that contain beneficial impact furnishing constituents: providing antioxidant and antimutagenetic properties. In particular, *D. kotschyi* was reported as immunomodulatory and antyhyperlipidemic effect manifesting plant. Xanthomicrol is the main cytotoxic component of *D. kotschyi* and is a potential anti-cancer agent [1]. Calycopterin is responsible for the inhibitory effect of *D. kotschyi* on lymphocyte proliferation [2].

In a previous work, we isolated and identified 5 flavonoids (ermanin, luteolin, apigenin, xanthomicrol and calycopterin) from *D. kotschyi*. In this study, we tried to quantify these compounds in 8 species of *Dracocephalum*. An HPLC method was developed for this purpose. The dried powder materials of the plants, were extracted 3 times (24 hour) by EtOAc. The amount of extracted flavonoids is indicated in the table. The optimal conditions of separation and detection were achieved on a C₁₈ column (250mm*4.6mm,5µm), with a gradient elution program.

Species	Luteolin (µg/g (RSD%))	Apigenin (µg/g (RSD%))	Ermanin (µg/g (RSD%))	Xanthomicrol (µg/g (RSD%))	Calycopterin (µg/g (RSD%))
<i>D. kotschyi</i>	1.31(14.1)	3.03(15.6)	2.07(4.3)	5.66(2.7)	6.75(0.086)
<i>D. subcapitatum</i>	0.72(3.7)	1.017(8.7)	2.388(6.3)	12.53(4.4)	7.3(0.6)
<i>D. surmandinum</i>	1.37(4.7)	3.326(2.6)	5.06(3.7)	18.37(1.6)	13.4(2.9)
<i>D. multicaule</i>	0.8(4.5)	2.329(9.3)	5.65(0.8)	10.73(1.1)	7.3(0.6)
<i>D. Aucheri</i>	0.899(4.5)	2.21(1.4)	0.56(0.9)	0.68(8.8)	0.4(3.3)
<i>D. oligadenium</i>	1.25(7.5)	3.46(9.1)	0.95(14.5)	1.88(5.9)	1.7(3.8)
<i>D. thymifloruml</i>	0.84(3.0)	1.72(0.4)	0.52(0.5)	0.6(0.5)	0.7(0.07)
<i>D. polychaetum</i>	3.75(0.24)	5.49(2.9)	14.09(1.1)	30.30(4.1)	19.9(1.6)

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TWO SESTERTERPENOIDS FROM *SALVIA LACHNOCALYX*

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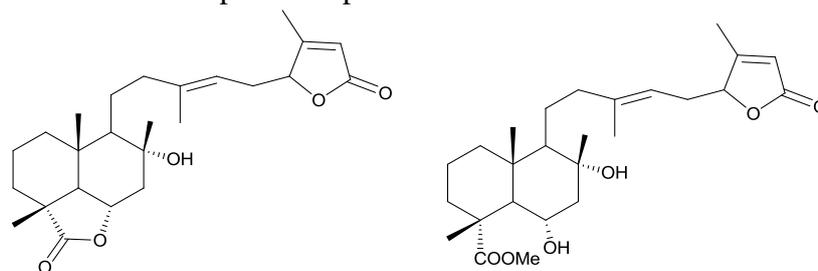
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The *Salvia* species are important medicinal and culinary plants, and they have been the subject of numerous chemical and biological studies. Apart from their common constituents (terpenoids and flavonoids) and their interesting biological activities, the genus *Salvia* is unusual, as it is the only genus in the Lamiaceae that produces sesterterpenes [1]. In contrast to di- and triterpenoids, sesterterpenoids are rare in nature and have been reported most commonly in marine sponges and algae. Among *Salvia* species, these rare and interesting compounds were isolated and identified for the first time from Iranian species, and this prompted us to undertake a systematic phytochemical investigation of members of this genus. The genus *Salvia* is represented in the Iranian flora by 61 species, of which 17 are endemic. *Salvia lachnocalyx* is an endemic and range restricted species which grows in the Fars province of Iran.

As a part of an ongoing research program aimed at the isolation, structural characterization, and pharmacological evaluation of bioactive secondary metabolites from plants [2], we started the phytochemical analysis of *Salvia lachnocalyx*. Our studies led to the isolation of two sesterterpene lactones, whose structures were secured by means of 1D&2D NMR spectroscopic methods.



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**EXTRACTION OF CYCLOTIDE FROM VIOLA IGNOBILIS BY THE
USE MICROWAVE ASSISTED EXTRACTION METHOD**

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Cyclotides are a unique family of head-to-tail cyclic plant peptides with three disulfide bonds and about 27-32 amino acids in their structures [1]. They contain a unique structural motif that consists of a head-to-tail cyclic backbone and knotted arrangement of three disulfide bonds, together referred to as the cyclic cystine knot (CCK) [2]. This motif engenders cyclotides with exceptional resistance to thermal, chemical and enzymatic degradation. Cyclotides exhibit a range of interesting bioactivities, including uterotonic, anti-HIV, anti-microbial, cytotoxic and etc [3]. Irradiation of proteins by Microwave could modify the molecular properties [4]. Due to the structural differences of cyclotides with normal proteins, such as cyclic structure and strong disulfide bonds in the capital structure, maybe microwave assisted extraction (MAE) could not change their molecular properties. So, this study is focused on the extraction of cyclotides from *Viola ignobilis* by MAE method. As the attention to the last reports on their extraction methods using microwave active solvents such as methanol and water; MAE was introduced as a potent extraction method. The procedure was performed in four steps using two microwave instruments (500 and 1200 W) under the different conditions. The influential parameters including time, temperature and the ratio of the weight of sample to the volume of solvent, which are affecting the MAE potency, were optimized. In order to investigate the effect of microwave on the primary structure of the cyclotides, MALDI-MS was utilized. Comparing the spectrum of cyclotides extracted using MAE, with those of maceration method showed that cyclotides were extracted without altering the primary structures.

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**IDENTIFICATION OF VOLATILE ORGANIC COMPOUNDS IN
BACILLUS THURINGIENSIS BEFORE AND AFTER SILVER
NANOPARTICLES TREATMENTS AND ITS INFLUENCE ON THE
NATURE OF THE PEPPERMINT ESSENTIAL OILS**

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The metabolome, the interesting systems chemistry of life processes, is the functional outcome of the activity of the genome, functional genome, and the proteome. Metabolic processes are the ultimate expression of gene and protein activities to meet the physiological demands for growth and survival. Metabolites are the intermediates and products of metabolism. The term metabolite is usually restricted to native small molecules that participate in general metabolic reactions and is required for the maintenance, growth, and normal function of cells. Metabolomics has theoretical advantages over genomics, transcriptomics, and proteomics because the metabolic network is downstream from gene expression and protein synthesis and, thus, may reflect more closely the cell activity at a functional level. The environmental stress responses are usually alteration in metabolites proteins and genes, therefore are related to change produced metabolites. One of the tensions is administration of nanoparticles in terms of using chemical fertilizer or agricultural pesticides which contain silver titanium oxide, to control fungal and bacterial disease. Silver NPs are one of the most widely used NPs which are found in all wastewater from different agriculture water sources have been seen as agriculture water. The loss of many plant pathogens and beneficial bacteria in the soil were eliminated by Silver NPs reducing crop yields. The aim of this study was to investigate the effect of silver NPs on soil beneficial bacteria and its impact on plant secondary metabolite, *spearmint*. Volatile organic compounds released by bacteria which coexisted with plants may be responsible for plant growth and production of secondary metabolite. Inhere the volatile organic components generated by bacteria *Bacillus Thuringiensis* were separated and identified. Also the effect of these compounds on production of plant secondary metabolies before and after addition of silver NPs on medium culture bacteria were examained. In order to obtain and utilize VOC profile information for *Bacillus Thuringiensis* identification, fast and sensitive methods are required. As Gas chromatography coupled with mass spectrometry (GC-MS) has been commonly used to detect VOCs produced such as aliphatic alcohols, ketones, and alkenes from other bacterial cultures, we used this method to achieve our aim study.

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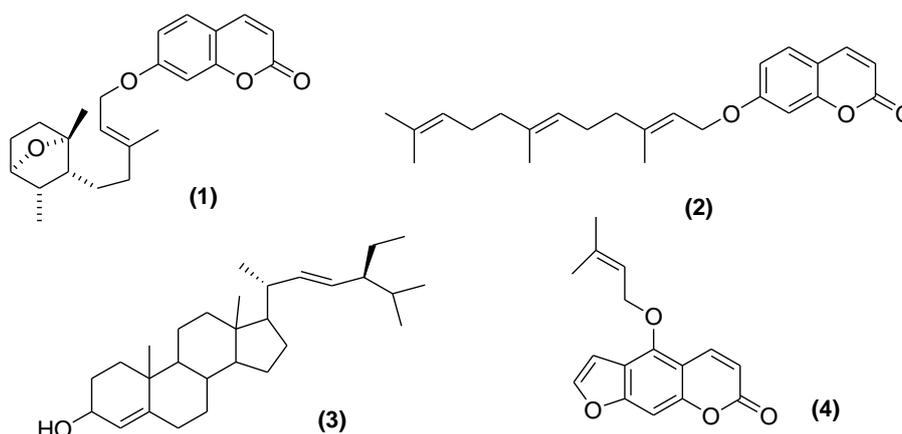
CHEMICAL COMPOSITION OF PLANT EXTRACTS FROM *FERULA HIRTELLA* AND *PRANGOS ACAULIS*

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Genus *Ferula* and *Prangos* belong to family Umbelliferae. Genus *Ferula* has about 130 species distributed throughout the Mediterranean area and Central Asia [1]. This genus is well documented as a good source of biologically active compounds such as sesquiterpene derivatives [2]. There is no report about investigation of chemical composition of aerial parts extract of *F. Hirtella*. Genus *Prangos* that comprises 30 species of perennial herbs, distributed in the mediterranean region, Caucasia, Central Asia, Turkey, Iraq and Iran. Previous phytochemical investigations on the root of *P. acaulis* revealed the presence of various coumarins [3].

Coumarin derivatives found an important class of therapeutic agents in medicinal chemistry including anti-tumor, anti-inflammatory, anti-HIV and analgesic [4]. In the present study, the chloroform extract of aerial parts of *F. hirtella* and *P. acaulis* were analysed. Two coumarins, including Farnesiferol C (1) and Umbelliprenin (2) together with β - Stigmasterol (3) were isolated from the extract of *F. hirtella*. From the extract of *P. acaulis*, a coumarin, namely Isoimperatorin (4) was identified. The structure of compounds was identified by their spectroscopic analysis and comparison of their spectral data with those reported in literature.



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**THE EFFECT OF MICROENCAPSULATION ON THE
ANTIOXIDATIVE CAPACITY OF COLOR COMPOUNDS OF
BERBERIES (*BERBERIS VULGARIS*)**

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The object of this study was to evaluate the influence of the microencapsulation on the antioxidative capacity of color compounds of berberis. At the first step, the effective compounds of berberis were extracted and concentrated. Then, the solutions of 20 percent of maltodextrin (MDX, dextrose equivalent 16.5-19.5) and mixture of 10 percent of MDX with calcium alginate (Ca-Alg) were prepared. The percent of solid soluble solution of each solution was adjusted to 20 percent by adding of concentrated color extract. Afterwards, the prepared solutions were dried with freeze dryer at -55°C. The characteristics of microcapsules such as the yield of microencapsulation, phenolic compounds, anthocyanin content, radical scavenging compounds (DPPH), and ferric reducing activity of plasma (FRAP) were evaluated. The results showed that the yield of microencapsulation and the anthocyanin contents in microcapsules prepared with MDX and mixture MDX-Ca-Alg were 41.75 and 47.39 percent; and 160.85 and 50.30 µg/ml, respectively. The DPPH in in microcapsules prepared with MDX and mixture MDX-Ca-Alg were 1055.83 and 1727.05, respectively. The positive regression was found between phenolic compounds and FRAP. As well, negative regression was found between anthocyanin content and IC₅₀ in such a manner that the IC₅₀ increased with reducing anthocyanin content.



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**HPLC DETERMINATION OF PHENOLIC ACIDS IN FOUR
SALVIA SPECIES WITH THEIR ANTIOXIDANT ACTIVITIES**

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In this study, 12 phenolic acids including gallic acid, protocatechuic acid, gentisic acid, chlorogenic acid, vanillic acid, caffeic acid, syringic acid, *p*-coumaric acid, ferulic acid, salicylic acid, rosmarinic acid and cinnamic acid were identified and quantified simultaneously in four *Salvia* species extracts from Iran. *Salvia* species used were *S. ruterana*, *S. urmiensis*, *S. lerifoelia* and *S. sahendica*. Reversed-phase high performance liquid chromatography equipped with photo diode array detector (RP-HPLC-DAD) and a multistep binary gradient elution program was applied for this measurement. Also antioxidant activity (DPPH assay), total phenol and flavonoid content of the tested plant were evaluated and compared to HPLC results. The results indicate that rosmarinic acid was the most abundant component in all species ranging from 127-642 mg/100 g dw plant. All species due to their considerable amount of rosmarinic acid and total phenolic content showed promising antioxidant activities even better than BHT as a commercial antioxidant compound [1, 2].

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**FLORISTIC IDENTIFICATION OF MEDICINAL PLANTS OF
SAVADKOH: TOWARDS AN ACTIVE SUBSTANCE AND
THERAPEUTIC EFFECTS**

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Since plants have long been used to treat disease and many developing countries are also currently employing the plants as a main treatment (2), extensive studies are necessary to identify plants and their healing properties in order to obtain a suitable program by which one might cultivate these resources towards financial earning (1). Mazandaran province owing to unique climate and geography is prone to the growth of plants.

The purpose of this study is to identify the medicinal plants of summer pastures of Savadkoh using native knowledge and scientific sources. In this study, the field survey was done by collecting plants of the region. Then, they have been investigated by various flors in the laboratory and subsequently were statistically analyzed. According to the results, the region had 72 species of plants in which they belong to the 19 categories. Namely, the categories include 25.6%, 15.38% and 12.82% of medicinal species of *Asteraceae*, *lamiaceae* and *Rosaceae*, respectively. In addition, the results showed that the active ingredients are essence, tannins, alkaloids, organic acids and resins, in which essence and tannins stand in the highest value. Moreover, leaves were the most abundant parts which have been utilized in terms of experimental analyses. It should be mentioned that the major use of these plants are attributed to the diuretic and antabillious effects where the natives of the region commonly use in the treatment of the corresponding diseases. Also, the inhabitants use the plants as vegetable edible, wound healing anti-burns agents and fragrant substances in food.

In conclusion, considering the regional potential to cultivate medicinal plants, as well as their role in disease treatment and other relative uses these plant species should be taken into account as significant values.

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**MEASUREMENT OF WATER REQUIREMENT AND CROP
COEFFICIENT OF BASIL IN ARDABIL**

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In Iran which is located in arid and semi-arid region of the southwest Asia, the shortage of water resources is one of the most important problems for agriculture section. With regard to major usage of water in agriculture section, precise measurement of water requirement for different kinds of agricultural crops is necessary. Although, water requirement of most crops has been presented by FAO, this has not been considered for vegetables such as Basil. Accordingly, this study was done to measure water requirement of Basil using lysimeter. With respect to this purpose, plants in the rectangular vase were implanted in the out of greenhouse environment and the ratio of input and output water requirement of them measured. Hence, reference evapotranspiration was estimated by Cropwat software and then Crop coefficient of Basil was calculated. The results showed water requirement of Basil for Jun, July and August are 5.49, 7.43 and 9.31 mm.day⁻¹, respectively, and crop coefficient of Basil for mentioned months are 1.038, 1.039 and 1.379, respectively., since the water requirement of plant is a function of environmental conditions, this experiment would be done for several successive years and yearly conditional environment also be considered



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**AN OVERVIEW ON PHYTOREMEDIATION OF HYDROCARBON
POLLUTIONS IN SOIL**

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Each year high volume of consumed water in agriculture is wasted without any effect on increases the yield, due to lack of awareness and unsuitable management practices. These losses in water efficiency can be reduced by awareness from proper water requirement of crop plants. The aim of this study was to measurement of water consumption of *satureja hortensis*. Using lysimeter method. For instance plants were grown in rectangular pots , outside of greenhouse, and input –output water levels were measured. Plants were harvested at flowering stage. Using cropwater software and weather date obtained from meteorological station of Ardabil, reference evapotranspiration of plant was determined. Then crop coefficient (k_c) of savory was calculated by $ET_c = K_c \times ET_o$ equation.

water requirement in Jun, July, and August were 5. 67, 7. 57, and 9. 43 respectively and crop coefficient for these months were 1. 071, 1. 058, and 1. 397 respectively. result indicated that, the minimum and maximum water requirement were occurred in first and was in the third month of plant growth. Increases in water requirements can be related to increases in growth of leaf and aerial part of plant. The amount of essential oils obtained from these of these plants were 1. 25% that didn't show significance difference with farm condition (1. 5%). This research was done in unique growth period since the water requirement of plant is a function of environmental conditions, it would be better to do this experiment for several successive years and also, yearly conditional environment be considered.



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**ACARICIDAL EFFECTS OF SOME FORMULATED COMPOSITIONS
BASED ON PEPPERMINT AND ROSEMARY ESSENTIAL OILS
AGAINST THE TWO-SPOTTED SPIDER MITE (*TETRANYCHUS
URTICAE* KOCH)**

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The two-spotted spider mite, *Tetranychus urticae* Koch, is a polyphagus pest which infests wide range of field, garden and greenhouse crops worldwide [1]. Intensive and improper pesticide applications have led to problems such as resistance development, undesirable effects on non-target organisms, secondary pest outbreak, pest resurgence and environmental pollutions [2]. Plants are rich sources of secondary metabolites with pesticidal properties which can be a suitable alternative to chemical pesticides in pests management [3]. In this study, contact toxicity of three formulated compositions based on herbal essential oils including chinaberry oil 5% +peppermint oil 2%, chinaberry oil 5%+rosemary oil 2% and chinaberry oil 5%+rosemary oil 2%+peppermint oil 2% by leaf dipping method [4] were tested against female adults of *T. urticae*. The essential oils were obtained by Clevenger-type water distillation. Experiments were carried out at 25±1°C, 50±5% relative humidity and under a photoperiod of 16L: 8D. The LC₅₀ values for the formulated compositions were 7.472, 6.716 and 3.399 ml/L, 24h. after treatment, respectively. The results show that formulated composition based on both rosemary and peppermint oils had the highest lethal effect and the lowest LC₅₀ value rather than the other compositions. Also, Comparing the calculated LC₅₀ values of treatments indicated that blending rosmary and peppermint oils had a strong synergistic effect on the female adults of *T. urticae*

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**IN VITRO ANTIFUNGAL ACTIVITY OF VARIOUS METHANOLIC
PLANT EXTRACTS AGAINST *ALTERNARIA SOLANI***

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Regarding to dangerous consequences of application of synthetic pesticides on human and environment, searching and developing new strategies to control pest and diseases with less hazardous impacts and environmentally safe is a priority. Biologically active compounds found in plants seem to be more adaptable, acceptable and safer than synthetic compounds for environment and display a rich source of potential pathogens control agents [1]. *Alternaria solani* causes early blight disease of solanaceae family occurs annually to some degree in most production areas. In this study, crude methanolic extracts of 43 plant species belonging to 27 families, which most of them are medicinal plants, collected from the west of Iran were screened for antifungal activity against *Alternaria solani*. Methanolic extracts were obtained as described by Bahraminejad *et al.*, [2]. Bioassay of the extracts was conducted by agar diffusion method on agar plate cultures with five replications. The inhibitory effect of the extracts was examined at concentration of 2000 ppm. Twenty six of the 43 (61%) tested plant species exhibited varying degrees of inhibition activity against mycelia growth of *A. solani*. Results indicated that *Elaeagnus angustifolia* with 61% inhibitory effect, showed maximum activity against mycelia growth of *A. solani*. *Portulaca oleracea* (-46.55±0.61) increased the mycelia growth of fungus. The high number of plants with antifungal activity showed that the flora in the west of Iran could be regarded as a rich source of plants with antifungal activity.

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EARLY SEASON WEED CONTROL IN *FENNEL* (*FOENICULUM VULGARE* MILL.) WITH REDUCED RATE OF PENDIMETHALIN

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Owning low LAI index and long seasonal plant, make *Fennel* plant a poor competitor against weed especially in early season, therefore, protection from weed is essential for successful cropping. Since conventional hand and mechanical weed controls are not economically effective, the use of other weed control methods, such as chemical control, is necessary. Field experiment was carried out in 2012 to evaluate of pendimethalin as a pre-emergence herbicide for weed control in *fennel*. In this experiment the efficacy of different rates of pendimethalin (0, 660, 990, and 1320 g a.i. ha⁻¹) for selective control of grass and broadleaf weed species, were evaluated. *Amaranthus retroflexus*, *A. blitoides*, *Chenopodium album* and *Convolvulus arvensis* were the dominant broadleaf weed and *Echinochloa crus-galli* and *Setaria viridis* were dominant grass in all plots. Results showed that weed biomass significantly affected by herbicide rate and increasing herbicide dose generally improved both grass and broad leaf controls. However, Grass weeds were more susceptible to given rate of the herbicide compared with broad leaf weeds. For example the rate of 990 g a.i. ha⁻¹ reduced broadleaf weed biomass by 57% , while application of the same rate of herbicide controlled 91% of grass weed. Application of herbicide at the rate of 1320 g a.i. ha⁻¹ provided excellent control (>94%) of total grass weeds, however, this rate provided moderate control (<81%) of broadleaf weeds. Results from this research suggested that, greater rate of 1320 g a.i.ha-1 is required to maintain effective control of broad leaf in fennel, while, in area which grass weed are dominant weeds in fennel fields, the rate of 990 g a.i. ha⁻¹ could be sufficient to effective control of grass.



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**ISOLATION AND IDENTIFICATION OF THE MAIN CONSTITUENTS
OF ANTHEMIS HUSSKNECHTII**

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Zagros camomelia is local kordish (Gola Chavhesha, Gola Hajyana) of *Anthemis* genus. *Anthemis* is the second largest genus in Asteraceae. The genus *Anthemis* is known to contain sesquiterpen lactones and flavonoids, acetylenes and essential oils have been reported as the main classes of the secondary metabolites in this genus. To the best of our knowledge flower and other parts of *Anthemis hussknechtti* were not a subject of research up to now. The flowers of *A. hussknechtti* were collected on the mountain Sanandaj in Iran; in June 2011. Voucher specimen is deposited in the Institute of Botany of Sanandaj (Herbarium BEOU; No 2531). The flowers of *Anthemis hussknechtti* at ambient temperature and shade then powdered extracted with EtOAc, 3 times, each time for about 60h by percolation method. Main components were separated and isolated by means of chromatographic methods mainly column chromatography checked by TLC. These compounds were identified by spectroscopic methods, including ¹H-NMR, COSY, DEPT-135 and MS spectroscopy. Based on the NMR and MS data comparison of the data given in the literature, the structures of the isolated compounds were established as luteolin and 6,7,4 trihydroxy flavone. This is the first report of compounds isolated from this plant.



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ANTIBACTERIAL EFFECTS OF SOLVENT EXTRACTED MATERIALS
OF *PROSOPIS JULIFLORA* AERIAL PARTS

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Prosopis juliflora, which belongs to the family of Fabaceae, is an endemic plant flora of some different parts of the world and also can be find in south of Iran [1]. In this study, organic solvents (Methanol, n-Hexan and Ethyl acetate) were used for extraction of plant materials from leaves and fruits of the plants by standard procedure and then antibacterial activities of the extracts were evaluated. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the plant materials were determined against 6 bacterial standard strains and 1 yeast, by broth micro-dilution method as recommended by CLSI (Clinical laboratory Standard Institute) with some modifications [2]. Chloramphenicol was used as standard antibiotic. Microbial strains contained *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* (3 different strains) and *Candida albicans*. The lowest recorded MICs were 0.075 and 0.125 mg/ml for n-Hexan extract of leaves against *E. coli* and *S. aureus* strains respectively. However the highest MICs values were 8 mg/ml, when the same extract was tested against *C. albicans*. It was surprising that Ethyl acetate extract of leaves could inhibit 3 tested strains of *P. aeruginosa* in concentrations ranging from 0.15 to 0.75 mg/ml. According to the results of this study, *Prosopis juliflora* could be considered as a hopeful source against some important human pathogenic bacteria which some of them could be inhibited by 0.016 and 0.04 mg/ml of Chloramphenicol. Determination of the effective antibacterial substances of the plant leaves is underway in our Institute.

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**PHYTOCHEMICAL ANALYSIS AND ANTIBACTERIAL EFFECT OF
ACHILLEA TENUIFOLIA LAM.**

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Asteraceae, the largest family of angiosperms, comprises about 1500 genera and 23000 species, distributed in three subfamilies and seventeen tribes. The genus *Achillea* is composed of 115 species of perennial herbs, all native to temperate regions of the northern hemisphere (1). Aerial parts of different species of this genus are widely used in folk medicine for preparation of herbal teas with antiphlogistic and spasmolytic activity (2). One document published about two centuries ago as Makhzan-ol-Advieh, recommended it for bladder stone and urinary obstruction (3). In recent studies, the extract of this genus exhibits pharmacological activities like anti-inflammatory and antiallergic (4), antihelminthic, cholagogue, antibacterial and antioxidant properties. Therefore, the many uses of *Achillea* species have created wide interest in their phytochemistry and *Achillea tenuifolia* Lam., a perennial herb, distributed in some regions of Iran (5) was candidate for phytochemical analysis. The methanolic extract of *Achillea tenuifolia* Lam. afforded a dichloromethane fraction from which Stearic acid, Lupeol, β -sitosterol, Methyl gallate, besides three flavones have been isolated for the first time and the structures of the isolated compounds were elucidated based on NMR (one dimensional and two dimensional techniques), IR and MS spectra. In case of salvigenin (one of the flavones) effect of solvent on ¹H-NMR spectra have been studied. Although considering the numerous uses of this genus in folk medicine, the antibacterial effect of plant in comparison with some antibiotics is under investigation and the preliminary results showed interesting results. Surprisingly, in some cases the extract has more activity than antibiotics.

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**EVALUATION THE YIELD AND YIELD COMPONENTS OF CUMIN
LANDRACES (CUMINUM CYMINUM L.) AS AFFECTED BY THE BIO-
FERTILIZER UNDER DROUGHT STRESS**

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Environmental stresses, especially drought stress, plays an important role in reduction of plant growth stages and seed yield in arid and semi arid regions. Production of this plant is limited due to several biotic stresses of which wilt diseases is the most serious. In order to evaluate the effect of seed inoculation by Azotobacter and azospirillum on yield and yield components of cumin (*Cuminum cyminum*) was studied in experiment farm of Kerman University during 2011 growing season. The experimental was a split-plot design based on randomized complete bloke (RCBD) with three replicates. bio-fertilizer in four levels (Control, Azospirillum, Azotobacter, and Azospirillum + Azotobacter), drought stress in three levels normal (control), moderate (50% FC) and high (25% FC) with cumin landrace in two levels (Bardsir and Ravar) were assigned in plots. Results showed that traits plant height, number of branch per plant, number of seed per umbels, number of umbels per plant, seed weight per plant, 1000-seed weight, grain and biological yield significantly affected by drought stress. Grain yield 34.41% decreased under drought stress. Fertilizer effect and landrace and bio-fertilizers interaction were not significant on any of traits. There were a different significant among lines in number of umbel per plant, umbel seed per plant, seed weight per plant and 1000-seed weight. Interaction effect of landrace and bio-fertilizers had a significant effect on plant height, stem diameter, number of branch per plant, number of sub umbels per umbels, number of seed per umbels, 1000- seed weight and biological yield. Triple interactions showed significant difference on number of branch per plant, number of umbels per plant, seed weight per plant, number of seed per plant and number of seed per umbels. The maximum grain yield 303.67 kg/ha was obtained of Azospirillum treatment and Ravar landrace in normal condition. Data correlations in normal and stress condition showed, between grain yield and stem diameter, number of branch per plant and number of umbels per plant were positively significant in both (normal and stress) conditions. Among these microbial groups bacteria and arbuscular mycorrhizal (AM) fungi are ubiquitous in the soil, and there is abundant literature to support the idea that these rhizosphere microbes interact in rather specific ways to influence their relationship with and their effect on plant growth Galleguillos et al [1] and Marulanda et al [2].

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**COMPARISON OF DIFFERENT EXTRACTION METHODS IN THE
EXTRACTION OF ESSENTIAL OILS FROM
*DRACOCEPHALUM KOTSCHYI***

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Dracocephalum kotschyi Boiss. is an annual herbaceous aromatic plant that belongs to the Lamiaceae family and find in natural site of mountainous and high lands. In traditional medicine, it use for fever reduction, joints pain, rheumatism, inflammation against and sore recovery. The SFME is a method that yields an essential oil with higher amounts of oxygenated compounds, and allows substantial savings of costs, in terms of time and plant material. SFME is a green technology and appears as a good alternative for the extraction of essential oils from herbaceous aromatic plants. In this study essential oils were obtained from *Dracocephalum kotschyi* Boiss. by solvent-free microwave extraction (SFME), microwave-assisted extraction (MAE) and hydrodistillation (HD). The essential oils were analysed by gas chromatography–mass spectrometry (GC–MS). GC–MS analyses of the oils revealed the presence of 27, 30 and 21 compounds in the essential oils obtained through SFME, MAE and HD respectively. Higher amounts of oxygenated monoterpenes such as perilla aldehyde, geranial, *trans*- carveol, neral, carvone and geraniol were present in the oil of SFME(79.42%) and MAE(75.2%) in comparison with HD(62.24%).



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**EVALUATION OF TOTAL PHENOLIC CONTENTS AND
ANTIOXIDANT ACTIVITIES OF THREE APPLE (*MALUS
DOMESTICA L*) CULTIVARS GROWN IN WEST AZERBAIJAN**

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Apples (*Malus domestica L*) are recently indicated to have many health-promoting activities, especially anticancer, antiradical, and antioxidant activities – most of these activities are believed to be due to their antioxidants that prevent free radical damages. The phenolic compounds in apples contribute in most of the antioxidant activities of the fruits. Recent studies have shown that the content of phenolic compounds in apple varies considerably among different cultivars. In this study the total phenolic contents and antioxidant activities of methanolic extracts from three different apple cultivars (golden delicious, red delicious, granny smith) grown in West Azerbaijan were determined. The antiradical activity of apples was tested by measuring their ability to scavenge DPPH radical. Total phenolic compounds content from extracts was determined by spectrophotometry (absorbance at 760) according to the Folin-ciocalteu procedure. The results showed that red delicious had the highest polyphenol content ($46.5 \pm .028$ mg GAE/g). The granny smith ($31 \pm .028$ mg GAE/g) had higher polyphenol content than golden delicious ($27 \pm .028$ mg GAE/g). The golden delicious showed the highest DPPH radical scavenging activity. We observed a positive correlation between antioxidant activities and the polyphenol contents in all three extract. Our results provide a scientific basis for the use of these plant species in folk medicine as well as additional resources for the discovery of novel antioxidants.



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**STUDY THE ETHNOBOTANY OF MEDICINAL PLANTS IN DARAB,
FARS PROVINCE**

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Traditional knowledge about medicinal plants is very valuable and old people of cities have so much information about it. Death of these people contributes to the loss of this knowledge. Therefore it is necessary to be recorded this information. Traditional methods for the identification of medicinal plants and their medicinal effects are essential. This article presents the results of a study on identification of important medicinal plants, used to treat diseases in Darab region, by local residents. It is also the first field research into medicinal plants conducted in the area with ethno botanical methodology. Plant species are collected from various locations in the region Darab and were identified by Flora Iranica. This work is based on observations, interviews, and guided trips during their flowering season. For each plant species a scientific name, local name, and organ used as common therapeutic form was recorded. The information was collected between March to October in 2011. Generally 50 medicinal plant species belonging to 30 families are listed in this paper.



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**EFFECTS OF DIFFERENT CONCENTRATIONS OF ZINC ELEMENT
ON MORPHO-PHYSIOLOGICAL TRAITS OF FENUGREEK
(*TRIGONELLA FOENUM- GRAECUM*) IN HYDROPONIC CONDITIONS**

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In order to study of different concentrations of Zinc on Morpho-physiological characteristics of Fenugreek (*Trigonella foenum- graecum*) and its accumulations in plant tissues, an experiment was conducted in Khorassan Agricultural and Natural Resources Research Center in Hydroponic condition using Complete Hoagland Nutrient Solution (CHNS) with light intensity of approximately 8000 Lux., temperature 20 ± 2 °C for photoperiod of 16:8 Light/Dark hours. Fenugreek seeds were sterilized with 2.5% Sodium Hypo chloride and then moved to Petri dishes in 20 ± 2 °C. Seedlings with root length of 30-40 mm were placed to complete nutrient solutions until the seedlings reached to second trifoliate stage. After that eight levels of Zinc Concentrations including CHNS + (0, 2.5, 5, 10, 20, 40, 80, and 160 ppm of Zn) were gradually applied with intervals of three days. Finally Plant tissues were separated to roots and shoots. Fresh weight was weighted and then oven dried in temperature 75 °C for 96 hours until reaching to constant weight. Dried samples were grinded and Zinc concentrations in each samples determined with Atomic absorption spectrophotometry.

Results showed that Zn different concentrations had significant difference ($P \leq 0.01$) in all of traits. Plant's shoot were died in treatments more than 80 ppm because of Zinc toxicity effects. Plant establishment percent and root dry weight had not affected up to 10 ppm, but more concentrations caused significant difference ($P \leq 0.05$) comparing control. Adding 2.5 ppm caused significant difference in shoot dry weight and SPAD comparing control and caused leaf Area Ratio (LAR) was increased. Green Leaf Area (GLA) and root length in Zn Concentrations more than 5 ppm had significant effects ($P \leq 0.05$) comparing control. Shoot: Root ratio decreased during plant growth. Accumulation of Zinc in plant tissues, reached to 6-12 fold in concentration of 40 and 160 ppm comparing with control respectively.



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CHROMATOGRAPHIC PURIFICATION OF Lycopene AND β -CAROTENE ISOLATED FROM TWO IRANIAN SPECIES OF CYANOBACTERIA

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Carotenoids are the red, orange, and yellow pigments found in the photosynthetic tissues of plants, algae, and micro-organisms, and are responsible for the feather and flesh colors of some birds and fish. In the recent years, studies on carotenoids have provided evidence on the various health benefits of them including reduced incidence of a number of cancers, reduced risk of cardiovascular disease, and improved eye health. They cannot be synthesized by human body; hence, they must be obtained from dietary sources. Worldwide demand for carotenoids increases yearly. Although most carotenoids are produced by chemical synthesis but, natural carotenoids are preferred by the health market. Our study on the characterization and quantification of bioactive metabolites isolated from several isolates of cyanobacteria from Iranian paddy soils, showed that two isolates including *Anabaena vaginicola* and *Nostoc calcicola* contain a high amount of carotenoids, especially lycopene (up to 24570 $\mu\text{g/g}$ dry weight, DW) which appears to be the highest reported amount until present; and β -carotene (up to 8133 $\mu\text{g/g}$ DW) which is comparable with the best natural sources of β -carotene [4]. Meanwhile, they are rich in the *cis*-isomers of lycopene and β -carotene which is important in their bioavailability and health benefits. So, it seems that these isolates of cyanobacteria could be introduced as new natural sources for obtaining the two key carotenoids, lycopene and β -carotene, which are of commercial interest. In continuation of our previous study, the extraction procedure was improved to obtain better recoveries of carotenoids. Purification of the desired carotenoids is also challenging due to the presence of other interfering sample compounds. In the previously reported studies which performed combined normal-phase and reversed-phase liquid chromatography for identifying carotenoids composition in fruits [5], a silica microbore or cyano microbore column was coupled to C18 monolithic column. Although C18 column is used for analysis of very polar to non-polar carotenoids, but it seems that using silica or cyano microbore column in the first dimension and C18 column in the second column can help clean-up our sample from undesirable carotenoids and separate lycopene and β -carotene better.



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**INHIBITORY EFFECTS OF VITEXIN ON SCOPOLAMINE-INDUCED
MEMORY IMPAIRMENT IN RATS**

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Neuroactive properties of various synthetic derivatives of natural flavonoids are determined. The present study aimed to investigate the effects of vitexin (5, 7, 4 trihydroxyflavone-8-glucoside), a flavonoid found in such plants as tartary buckwheat sprouts, wheat leaves phenolome, *Mimosa pudica* Linn and *Passiflora* spp, on scopolamine-induced memory impairment in rats. The effects of vitexin on memory retrieval were assessed in the presence or absence of scopolamine using a step-through passive avoidance trial. In the first part of the study, vitexin (25, 50, and 100 μ M) was administered intracerebroventricularly (i.c.v.) before acquisition trials. In the second part, vitexin, at the same doses, was administered before scopolamine (10 μ g, i.c.v.) and before the acquisition trials. During retention tests, vitexin (100 μ M) in the absence of scopolamine significantly increased the step through latencies compared to scopolamine. In addition, vitexin (100 μ M) significantly reversed the shorter step through latencies induced by scopolamine ($P < 0.05$). These results indicate that vitexin has a potential role in enhancing memory retrieval. A possible mechanism is modulation of cholinergic receptors; however, other mechanisms may be involved in its effects in acute exposure.



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**QUALITY AND QUANTITY ASSAY OF TANNINS IN FRUIT BARK OF
THREE CULTIVARS OF IRANIAN POMEGRANATE**

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Punica granatum L. belongs to Punicaceae family which has been extended all over the world especially in Iran. Pomegranate is an important nutritious-medicinal plant which has been used by human from many years ago. Tannins are a variety of secondary metabolites in plants. Medicinal properties of different parts of pomegranate such as its fruit bark are mainly due to presence of tannins. The main property of tannins is their stringent and this property is the base of its therapeutic effects. In the best of our knowledge there is no report about tannin contents of pomegranate cultivars from Iran. The aim of the present study is investigation on tannin contents of *Punica granatum* L. In this report, three cultivars (Syah, Malase Torshe and wild) were collected from Yazd, Markazi (Saveh) Mazandaran provinces respectively. After peeling, chopping and drying of barks, gallic acid and tannins were isolated by using continuous extraction apparatus with diethyl ether and ethyl acetate as solvents. Then purification of the compounds, the weight percentage of tannins was measured. It was concluded that wild cultivar contained highest amount of tannins and Siyah Yazd cultivar has the lowest tannin contents. Following qualitative assessment of the tannins was performed by using thin layer chromatography (TLC) with silica gel as stationary phases and methanol/water as solvents. The results indicate same tannins in cultivars of studied pomegranate. Finally tannins were isolated by using column chromatography with Sephadex LH-20 and MCI-GEL CHP-20P as stationary phases. Purification and determination of different kinds of tannins are still carried out via NMR and other methods in our laboratory.

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**THE EFFECT OF PH ON STABILITY OF THE ANTHOCYANIN-COPIGMENT COMPLEX IN AZARSHAHR RED ONION
(*ALLIUM CEPA*)**

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Anthocyanins show low-stability when exposed to different food processing condition. Copigments are colourless substance which can form a coloured cluster with colourless forms of anthocyanins. Copigmentation is the colour-stabilizing mechanism. The colour changes in fruits, vegetables and flowers may be caused by these reactions between anthocyanins and various organic compounds present in higher plants. In this study copigmentation of anthocyanin in red onion were investigated with four copigments: tannic acid, caffeic acid, coumaric acid, and benzoic acid. In this research the dependence of the copigmentation process on PH and copigment concentration were established. There copigmentation of anthocyanin resulted in increase in both hyperchromic effects and bathochromic shifts. In this study tannic acid has the biggest hyperchromic effect and the benzoic acid had the lowest hyperchromic effect. Five levels of copigment concentrations: 0,120,240,480,960(mg/l) were examined. In this study tannic acid predominate copigment among copigments. The suitable PH for copigmentation complex was in PH 3.5.

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EFFECT OF SALYSLIC ACID APPLICATION AND WATER STRESSES ON YEILD AND QUILTY OF GERMAN CHAMOMLE (MATRICARIA CHAMOMILLA L.)

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Chamomile is one of the well-known medicinal plants. Its essential oil is extensively used in: perfumery. Cosmetics, food industry, salicylic acid is an important factor that causes promotion plant resistant against different stresses (for example water deficiency stress) and pathogenic. In order to determine effect of three concentration of salicylic acid (0, 0.5 and 1mM) and three level of water stresses (40, 80 and 120 mm evaporation) on German chamomile. A field research was conducted as factorial experiment based on randomized split plot designed with three replications. The results showed that application of salicylic acid effect on main stem length, biological yield and essential oil percentage was significant. The highest main stem length and biological yield were observed in 40 mm evaporation (74 cm-344.7 g) and the highest essential oil content was observed in 0.5 mM of salicylic acid and 120 mm evaporation from class A pan.



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**METHANOLIC DATE SEED EXTRACT EFFECT ON PROGRAMMED
CELL DEATH IN HUMAN COLORECTAL ADENOCARCINOMA CELL
LINE (HT29)**

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Apoptosis or programmed cell death is an essential process for elimination of damaged cells [1] and also is fundamental for cancer therapy. Development of novel therapies seems to be significantly based on screening of new apoptotic agents [2]. Severe fragmentation of DNA during apoptosis can be readily measured by neutral comet assay. Migration of DNA fragments of apoptotic cells by the electrical field can produce comet-like images [3]. Antioxidant activity, anti-inflammatory and anti-aging properties of date seed was reported previously [4, 5]. Present study focuses on methanolic date seed extract effects on programmed cell death induction in human colorectal carcinoma cell line (HT29) using Comet assay. HT29 cells were grown in DMEM medium, exposed to different concentration of methanolic date seed extract (100, 200, 400 µg/ml) and DNA fragmentation associated with apoptosis was detected by neutral comet assay method. Apoptosis could not be demonstrated by all concentrations (100,200, 400 µg/ml) and all the apoptotic scores were below the significant level compared to control group. In conclusion this study showed that date seed extract cannot effectively induce apoptosis in HT29 adenocarcinoma cell line.

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CHEMICAL CONSTITUTES OF THE ESSENTIAL OIL OF
ARTEMISIA CHAMAEMELIFOLIA VILL

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The genus *Artemisia*, with the common Persian name of ‘dermane’, includes 34 species that are found wild all over Iran [1]. The Iranian species has been investigated chemically and presence of monoterpenes, sesquiterpenes, especially sesquiterpene lactones and essential oils reported [2]. In fact, the Iranian *Artemisia* spp. has yielded a considerable amount of new, interesting terpenoids. Results a previous study showed that the major constituents of the essential oil obtained from the dried flowering aerial parts of *Artemisia chamaemelifolia* Vill were vulgarone B (38.8%), santolinyl acetate (10.5%) and 14-hydroxy-9-epi- β -caryophyllene (8.4%) [3]. Hydro-distilled essential oil of *Artemisia chamaemelifolia* Vill aerial parts at two phenological stages including before and 50% flowering collected from Pelor region in Mazandaran province, North Iran, were analyzed by gas chromatography (GC) and gas chromatography–mass spectrometry (GC–MS). The major constituents of essential oil of *Artemisia chamaemelifolia* Vill aerial parts at before flowering were 1,8-cineole (27.5%), borneol (7.7%), terpene-4-ol (4.9%) and camphor (4.1%). The main compositions of essential oil of *Artemisia chamaemelifolia* Vill aerial parts at 50% flowering were 1,8-cineole (31.4%), camphor (7.6%), borneol (7.0%) and terpene-4-ol (4.1%).

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STIMULATION OF YIELD AND PHYSIOLOGICAL FACTORS OF MINT (*MENTHA PIPERITA* L.) WITH FOLIAR APPLICATION OF BIOSTIMULATORS

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In plants, amino acids serve not only as the building blocks of proteins, but also as nitrogen transport compounds, precursors to plant hormones and precursors to many diverse secondary products. In the present work the effects of active amino acids based commercial formulation on yield and physiological factors of mint (*Mentha piperita* L.) were studied. The experiment was conducted during 2011 on the experimental farm of Tehran University. Four biostimulators (Aminolforte, Kadostim, humiforte and Fosnutren) and complete fertilizer were sprayed three times during vegetative stage. The experiment design included a complete randomized block with six treatments and three replications. The applied biostimulators (2 liters/ha) made a significant effect on the quality and chlorophyll content of mint. Foliar application of Fosnutren had a positive impact on a shoot dry weight. There was no variation in stem dry weight among Aminolforte, Kadostim and Fosnutren. All of these treatments improved the tested factors. Leaves in stem and leaf area were improved by Aminolforte. However, reduction in those attributes was observed in Humiforte treatment. Application of Kadostim and Humiforte improved the SPAD. Reduction in chlorophyll content was noticed in control treatment. There was no variation in leaf dry weight between Aminolforte and Fosnutren. Both of the treatments increased leaf dry weight. The aim of the study was to determine the effect of active amino acids on quality of mint [1].

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FINDING HIGH- QUALITY METHOD FOR DNA EXTRACTION FROM
ZIZOPHORA CLINOPODIOIDES

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The genus *Ziziphora L.* belongs to the family Labiatae consists of four species that widespread all over Iran. *Ziziphora clinopodioides* (kakuti-e kuhi) grows wild in Iran, Afghanistan, Iraq, and Talish. In Iranian and Turkish folk medicine, *Ziziphora* species have been used as infusion for various purposes such as sedative, stomachache and carminative. In Iranian folklore, the dried aerial parts of this plant have been frequently used as culinary and also in cold and cough treatments. The antibacterial activity of the oil of *Z. taurica* subsp. *clenioides* and *Z. taurica* has been studied [4]. Many studies require isolation of genomic DNA from various kinds of plant species. Because DNA degradation is mediated by secondary plant products such as phenolic terpenoids which may bind to DNA after cell lysis, the isolation of high quality DNA from plants containing a high content of polyphenolics such *Vitis spp.*, *Malus spp.*, *Pyrus spp.*, *Z. clinopodioides*, and conifers was a difficult problem [3]. We modified and optimized the existing CTAB method for plant genomic DNA extraction. DNA was extracted directly from freshly harvested leaves ground and freezeed leaves in pre-heated CTAB buffer. These protocols are traditional CTAB-based DNA extraction and its modifications. The modifications either involved use of activated charcoal and PVP, column based purification step or copper (II) acetate solution[1,2]. Chloroform: isoamyl alcohol (24:1) and RNase treatments followed by single purification step decontaminated the samples thereby paving way for selective extraction of DNA. The highest genomic DNA yield with the best quality was obtained when employing activated charcoal and PVP in the CTAB extraction buffer. In High molecular weight DNA yield in the range of 293 ng to 3667 ng/μL with an average of 1530 ng/μL was obtained from 40 samples of cultivated and wild *Ziziphora* species. With an absorbance ratio at 260 to 280 nm range of 1.5 to 2.18 and a mean of 1.91, very low levels of protein and polysaccharide contamination were recorded. DNA extracted by this method is also suitable for PCR amplification, indicating the absence of impurities. This modified method is suitable for most plants especially members of the Labiatae.

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**THE REACTION OF BALM (*MELISSA OFFICINALIS* L.) TO
DROUGHT STRESS**

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Water deficit stress, permanent or temporary, limits the growth and the distribution of natural vegetation and the performance of cultivated plants more than any other environmental factors. In order to study the effects drought stress on some morphological characteristics of Balm (*Melissa officinalis* L.), a research was conducted at Alborz Research Institute of Forest and Rangelands in 2012. Field experiment was performed a Randomized Complete Block Design with three replications. Treatment included irrigation after 40 (non stress), 80 and 120 mm water evaporation from evaporation pan class A. The results showed that effect irrigation on shoot yield, plant height, canopy diameter, leaf number, length and width of leaf and internodes was significant ($\alpha=0.001$). Comparison of treatment means showed that highest shoot yield (1331.80 kg/ha), highest height (25.32 cm), highest canopy diameter (51.71 cm) and leaf number (300.25 n/p) was related to irrigation after 40 mm (non Stress). The no significant difference between traits related to treatments at 40 and 80 mm evaporation show that balm is drought tolerant and can be produced in water deficit conditions and rainfall farms with irrigation management.



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**STUDYING OF SEED YIELD AND YIELD COMPONENTS OF
DIFFERENT ECOTYPE OF *CORIANDRUM SATIVUM* IN CLIMATE OF
ARDABIL**

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Coriander with the scientific name *coriandrum sativum* is an annual plant from the Apiaceae family that the oil fruit (seed) of it contain 50% Linalool and use in food and pharmacology. History of culturing of this plant in Iran is so long but little research about the fruit of it has done. In order to determine the most suitable ecotype in Ardabil climate and the best time to harvest seeds at different stages of seed (green, brown and black) experimental design randomized complete block with three replications at the research farm of department of horticultural science of agricultural faculty of Mohaghegh Ardabili in 2011 was conducted. The result of analysis showed that there is no difference between researching ecotype in characteristics of seed yield, thousand seed weight, the number of seed per cycle and the number of cycle in each plant. Result showed that for yield (7.15) and thousand seed weight (11.29) of Hakim Abad (Tabriz) ecotype were produced more seed than Bjstan, Behbahan and Shiraz ecotype and the best time for harvesting according seed quality and quantity was the brown color that between ecotypes was no significance difference.

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**EFFECT OF POLYVINYLPIRROLIDONE (PVP) ON INDUCTION AND
MULTIPLICATION OF CALLUS ON IRANIAN
HYPERICUM PERFORATUM L.**

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Hypericum perforatum L. (St. John's wort) a perennial medicinal plant used in the treatment of neurological disorders and recently identified as possible treatment for cancer tumors. The plant has numerous biologically active compounds. The principal medicinally important secondary metabolites present in St. John's wort are thought to be hypericin, hyperforin and pseudohypericin. The aim of this work was to obtain an efficient callus induction and micropropagation system of *H. perforatum*. Because of callus induction and proliferation systems are known to be very useful for the biosynthesis of natural products. In this study, callus formation from leaf and stem explants of *Hypericum perforatum* L. (population Azadshahr was investigated) Two influence of two growth regulators BA and KIN of the concentration of one milligram per liter In combination with 2, 4-D to 25/0 mg/L using four concentrations Polyvinyl Pyrolidone (PVP) 0, 50, 100, 200 mg/L on the MS medium. In this research, produced callus was green in color and compact and induced in all of treatments. The highest callus fresh weight (4.1 gr) was obtained from leaf explants cultivated in the presence of 1 mg/L BA and 0.25 mg/L 2, 4-D with 100 mg/l PVP in the dark condition. The least of callus fresh weight was obtained from stem explants cultivated in the presence of 1 mg/L kin and 0.25 mg/l 2, 4-D with 100 and 50 mg/l PVP in the dark [1,2].

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**THE COMBINATION OF HYDROPHOBIC ABSORBENT AND
HYDROPHILIC INTERACTION LIQUID CHROMATOGRAPHY FOR
SEPARATION AND PURIFICATION OF 10-DEACETYL BACCATIN III
AND TAXOL SEPARATELY**

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Taxol and 10-deacetyl baccatin III (10-DAB III) are two most important taxanes that widely extracted from different genus of taxus (yews) and cell culture media. These compounds are used as precursor agent in the production of taxotere (anticancer drug). One of the most problems in industrial production of these compounds is complexity of media of plant (and other sources) and also small amount of these compounds in natural sources. So extracting and purification are expensive processes and it is necessary to use pre-concentration methods before final purification by preparative chromatography. In recent researches, various absorbents are introduced as pre-concentration agents in complex media. So in this work, several absorbents are investigated and a combination of hydrophobic absorbent (Diaion[®] HP-20) and hydrophilic interaction liquid chromatography (silica) are introduced as low cost method for large scale production of Taxol and 10-DAB III. Pollar compounds like sugars and chlorophylls are discarded by Diaion[®] HP-20. Absorbent eluted with different percentages of water/methanol mixture for isolation of taxol and 10-DAB separately. Two fractions loaded on solid phase extraction column which is packed with silica and eluted with methanol/water. Fractions analyzed by high performance liquid chromatography (HPLC) and pure compounds (>99%) are collected with preparative HPLC (C18). Liquid chromatography-mass spectrometry (LC-MS) was used for monitoring of taxanes



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**EVALUATION OF SEASONAL EFFECTS ON TRANSPLANTING OF
FERULA GUMMOSA FROM WILD TO GREEN HOSE**

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Ferula gummosa L. is very important medicinal plant and has multiple pharmacological properties such as tonic and antiseptic effects and specific applications in cosmetic industry. Its reproduction has certain limitations such as seed dormancy, long, low yields and germination, and seedlings were exposed to low permeability. In this research vegetative propagation of *Ferula gummosa* L. was studied. For study of growth cycle and its habitat needs, and the best transplant of them, 20 underground roots of *Ferula gummosa* L. in two growth sessions (early spring and early autumn) were removed and transferred to greenhouse conditions. The results showed that early autumn roots had better from early spring roots. This information and interesting results will present with some important images and figures.



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**THE ROOTING OF *ZIZIPHORA TENUIR* L. STEM CUTTINGS
WITHOUT USING OF CHEMICAL HORMONES**

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Domesticating of wild medicinal plants is very important need and necessary to respond to the growing needs of the global pharmaceutical plants using. This procedure also is useful for laboratory studies on medicinal plants. *Ziziphora tenuior*, Khlyk Othee, also says in Azeri language, is important medicinal herb in folklore of the people of Iran, especially in North West. In this research, the possibility of rooting in *Ziziphora tenuior* stem cuttings, were studied. Three kinds of stem cuttings (softwood, semi-hardwood and hardwood cuttings) in two growth sessions (early Spring and early Autumn) were cultured on small sand without treatment of any rooting hormones. Statistical data showed the percentage of rooting, number and length of rooting in early autumn cuttings, had significant differences with early spring session and had better results.



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**METABOLOMICS-BASED APPROACHES AND ITS APPLICATIONS
IN MEDICINAL PLANTS STUDIES; CASE STUDY ON
*THYMUS VULGARIS***

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Twenty five percent of medications prescribed globally are based on plants or plant-derived compounds. But still there is lack of information regarding any changes in medicinal compounds due to environmental factors. Plant metabolomics has been applied to wide-ranging applications. The main strategies that are currently employed include metabolite fingerprinting, metabolite profiling (or non-targeted analysis) and finally targeted analysis. Depending upon the biological question, one of the strategies is selected and relevant technology/ies implemented. Based on various parameters such as time of analysis, selectivity, sensitivity and reproducibility one of the chromatographic methods in addition to one of the spectrometric methods such as Mass Spectrometry (MS) or Nuclear Magnetic Resonance (NMR) spectroscopy is required for metabolomics study. However, throughput and economy can be maximised by employing direct analysis by mass spectrometry without priori chromatography. Likewise, DIMS has extremely reproducibility for m/z. For instance FT-ICR-MS has the highest mass accuracy and mass resolution among other MS technologies. To analyze huge output data including m/z and ion intensities, data analysis workflow at the University of Birmingham are used which mainly are simstitching, signal filtering, normalization and missing values, transformation and finally Mi-Pack for identification. In our investigation, to study of drought stress tolerance mechanisms in *Thymus vulgaris* metabolite profiling has been done by FT-ICR/MS to explore any significant metabolite changes between treated and non-treated plants. PCA based on polar positive metabolites could classify plants in two distinct groups and univariate analysis identified 2000 significant peaks out of 5700 peaks detected. Mi-Pack software identified 387 metabolites and likewise metabolic pathways, amino acids, carbohydrates, secondary metabolites and plant hormones had significant component.



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ANTI-DIABETIC, ANTIMICROBIAL AND ANTIOXIDANT
ACTIVITIES OF VARIOUS SOLVENT EXTRACTS FROM ELEVEN
MEDICINAL PLANTS

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In the present study, α -amylase and α -glucosidase inhibition, antimicrobial activity (against *Staphylococcus aureus*, *Salmonella enteritidis*, *Pseudomonas aeruginosa* and *Bacillus cereus*), antioxidant activity (DPPH radical scavenging) and total phenolic contents of *n*-hexane, ethyl acetate and methanolic extracts of various parts of (1) *Allium paradoxum* (M.B.) G. Don (Liliaceae), (2) *Buxus hyrcana* Pojark. (Buxaceae), (3) *Convolvulus persicus* L. (Convolvulaceae), (4) *Eryngium caucasicum* Trautv. (Apiaceae), (5) *Heracleum persicum* Desf. ex Fischer (Apiaceae), (6) *Parrotia persica* C.A. Mey (Hamamelidaceae), (7) *Pimpinella affinis* Ledeb. (Apiaceae), (8) *Primula heterochroma* Stapf (Primulaceae), (9) *Pyrus boissieriana* Buhse (Rosaceae), (10) *Ruscus hyrcanus* Woron. (Liliaceae), (11) *Smilax excelsa* L. (Liliaceae) were investigated. These plants were collected from Hyrcania region, Sari, Iran. The results of this screening showed that, *H. persicum*, *P. persica*, *P. heterochroma*, *P. boissieriana* and *S. excelsa* had the best activities at α -amylase and α -glucosidase assays and can be assumed as good candidates for more investigations to obtain potent anti-diabetic natural products or probable lead compounds. Also, *H. persicum*, *P. Boissieriana*, *B. hyrcana*, and *C. persicus* showed the best activities in antimicrobial assays. All these plants exhibited strong antioxidant activity [1,2].

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ESSENTIAL OIL COMPOSITION OF *CONVOLVULUS PERSICUS* L.:
THE FIRST REPORT OF THE ESSENTIAL OIL ANALYSIS ON
CONVOLVULUS GENUS

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Convolvulus is a genus of about 250 species of flowering plants in the Convolvulaceae family, widely distributed in the Middle East. *Convolvulus persicus* L. is one of the species of this genus that distributed in the Southern coasts of Caspian Sea. The aerial parts of *C. persicus* were collected from Sari (Mazandaran, Iran) in Jun 2011. At this work chemical compositions of the essential oil obtained by hydrodistillation of the aerial parts of *C. persicus* were investigated by a combination of GC and GC/MS. This is the first report on the analysis of the essential oil from a species of *Convolvulus* genus. Twenty components, representing 89.0% of the total oil composition, were characterized with (E)-caryophyllene (46.6%), dodecanal (8.8%), caryophyllene oxide (5.7%), tetradecanal (4.4%), dihydroedulan I (4.4%), α -humulene (2.9%), tridecanal (2.5%), α -copaene (2.4%) and (E)- β -ionone (2.0%) as the major components [1].

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