PP-1

Antibacterial and antidiarrhea activities of *Heeria insignis*

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Heeria insignis O. Ktze (Anacardiaceae) is used traditionally in Nigeria in the treatment of diarrhea, veneral diseases, tapeworm, hookworm, schistosomiasis, and kidney trouble. The methanol and dichloromethane extracts of the leaves were evaluated for antibacterial (using agar-diffusion method) and antidiarrheal activities (using isolated rabbit jejunum and castor oil induced diarrhea in mice). The order of susceptibility of the test microorganisms to methanol extract were *Salmonella typhi>Pseudomonas aeruginosa>Staphyloccocus aureus>Bacillus subtilis>Escherichia coli* which were comparable to standard. The minimum inhibitory concentration (MIC) of the methanol extract against organisms is: *B. subtilis* (3.9), *S. aureus* (1.95), *E. coli* (62.5), *Ps. aeruginosa* (3.9) and *S. typhi* (1.95). On the isolated rabbit jejunum evaluation, both extracts produced concentration-dependent relaxation that was not blocked by phentolamine, suggesting that extracts act *via* mechanism other than alpha-adrenergic receptors. In the castor-oil induced diarrhea test, each extract separately gave 80% protection at 200 mg/kg which is comparable to loperamine 2 mg/kg with 80% protection. This finding may explain the use of the plant in diarrhea and bacterial diseases.

PP-2

Attenuation of vascular endothelial growth factor expression and leukocyte count during serotonin-induced acute inflammation by *Bixa orellana* leaf extract

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The aim of this study was to investigate the effects of aqueous extract of Bixa orellana (50 & 150 mg/kg) on serotonin (5-HT)-induced acute inflammation. This includes determining the expression Vascular Endothelial Growth Factor (VEGF) and leukocyte count in paw and air pouch model respectively. Two models of inflammation were employed, firstly the air pouch model (10 mg/ml 5-HT) and secondly the paw-induced inflammation model (0.2 mg/ml 5-HT). Air pouch was developed at the dorsal area of rat by subcutaneous sterile air injection on the 1st, 3rd and 6th day. Pretreatments were administered for 4 consecutive days along with 48 hours of 5-HT challenge. On the other hand, inflammation induced on rat's paw was left for 6 hours to assay for VEGF expression. Air pouch fluid was collected to measure total and differential leukocyte count while paw tissue was removed and preserved for VEGF quantification using murine VEGF ELISA kit. 27% inhibition of VEGF expression was observed in 150 mg/kg group followed by 24.3 % and 21% in Mianserin (5-HT antagonist) and 50 mg/kg group respectively. Leukocyte counts in both B. orellana-treated groups were significantly reduced compared to 5-HT control group. In conclusion, aqueous extract of B. orellana has a potential in reducing inflammation by decreasing differential leukocyte count and VEGF expression in acute inflammation rat models.

PP-3

Antidiabetic activity of the aqueous extract of *Anchusa strigosa* in streptozotocin (STZ) diabetic rats

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Diabetes mellitus is a major public health burden worldwide. In recent years, the treatment of diabetes with traditional plants witnessed a growing interest because side effects of insulin and oral antidiabetic drugs. Flowers of *Anchusa strigosa* Lab. (Boraginaceous) are used traditionally in Iraq for curing many kinds of diseases including diabetes.

The present study was carried out to evaluate the antidiabetic activity of aqueous extract of flowers of *Anchusa strigosa* in streptozotocin (STZ) diabetic rats. Orally administration of extract (250 and 500 mg/kg body weight) for 30 days revealed a dose dependent fall in blood glucose. Also there was an improvement in serum insulin levels. Cholesterol and triglyceride levels showed significant reduction in comparison with diabetic control group. The extract treatment also showed significant increase in hepatic glycogen levels. The results suggest that *Anchusa strigosa* possesses antidiabetic effects in STZ-induced diabetic rats.

PP-4

Antibacterial screening of the extracts of wild serbian lemon balm

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In this paper the water, ethanol and ethyl acetate extracts of the wild Serbian lemon balm (*Melissa officinalis* L.) were screened for their potential antibacterial activity. The aerial parts of the herb, collected on the Zlatibor Mountain (Serbia), were investigated. Antibacterial properties were tested in relation to the following bacterial species: *Agrobacterium tumefaciens*, *Bacillus subtilis*, *Erwinia carotovora*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*, *Sarcina lutea* and *Staphylococcus aureus*. The effect on bacteria was determined by filter disc diffusion method. The extracts were tested in the concentration of 5, 10 and 15 mg/disc. A commercial antibiotic dovicin (Galenika a.d., Belgrade) was used as a control. In general, the obtained results showed that the tested extracts inhibited more or less all the tested

bacteria. *B. subtilis* showed as the most susceptible bacterium and *E. coli* as the most resistant. The water and ethanol extracts were more active than ethyl acetate extract. The maximal tested concentration (15 mg/disc) showed the strongest antibacterial effect. The study showed that lemon balm, besides therapeutic effects, also has antibacterial properties.

PP-5

Content of total phenolics and antioxidant capacity of plant species *Potentilla recta* l., *Rosaceae*

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The examined material was picked up in May 2006 in the surroundings of Sarajevo, Bosnia and Herzegovina, dried in thin layer and pulverized immediately before the experiment. Radical scavenging capacity of plant water extracts against stabile radical DPPH. (2,2-diphenyl-2-picrylhydrazyl hydrate) was determined spectrophotometrically according to the method described by Yen and Duh. We have also examined the antioxidant capacity of water extract, after treatment with ethyl acetate (for removing soluble condensed tannins).

The content of total phenolic compounds was determined by Prussian blue method and procyanidins with acid butanol method in water extract. Antioxidant capacity: herb 78.79 %, rhizome with root 65.66 % and after removing soluble condensed tannins with ethyl acetate the results were: herb 17.34 %, rhizome with root 18.83 %. Total phenolics results: herb 9.70 %, and for rhizoma with root 8.96%. Procyanidins in extracts: herb 0.16% rhizoma with root 9.04%. On the basis of the antioxidant capacity found in extracts, it can be presumed that the main antioxidant capacity in herb as well as rhizoma with root was from phenolic compounds soluble in ethylacetate (procyanidins).

PP-6

Inhibitory effects of *Plectranthus barbatus* and *Plectranthus ecklonii* extracts on growth and virulence factors of *Streptococcus sobrinus* and *Streptococcus mutans*

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Dental caries is an oral disease that results from the interaction of bacteria and diet component, in dental surface. *Streptococcus mutans* and *Streptococcus sobrinus* are main pathogens involved in the development of this disease in humans. In order to investigate the potential anti-caries of aqueous and methanolic extracts of *Plectranthus barbatus* and *Plectranthus ecklonii*, we investigated the effect of these extracts on growth, viability and virulence factors of these two species. The inhibitory effect on growth and viability was evaluated by determining the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). MIC values ranged from 0.2 to 5.0 mg / ml and MBC values ranged from 0.6 to 10.0 mg / ml. The effect of the extracts in virulence factors was assessed through the inhibitory effect on activity of glucosyltransferase enzyme and the formation and viability of the biofilm. The inhibitory effect on glucosyltransferase activity was calculated through the IC_{50} value, which ranged from 1.1 to 3.1 mg /ml. The inhibitory effect on biofilm formation presented IC_{50} values between 0.12 to 2.7 mg / ml and the biofilm formed presented values of IC_{50} of removing biofilm from 0.6 to 9.0 mg / ml. The methanolic extract presented the lowest inhibitory concentration.

PP-7

Effect of thyme (*Thymus vulgaris* L.) And garlic (*Allium sativum* L.) Extracts as medicinal plants in performance eeg quality and biochemical parameters on laying hens

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The study was designed to investigate the effects of commercial product of Thyme and Garlic extracts as medicinal plants in performance, egg quality and biochemical parameters on laying hens. A total of one hundred and forty four , 23-wk-old white Leghorn hens were randomly assigned in to 4 treatment (3 replicate/group) under the completely randomized design and fed diets supplemented with 0(control),0/05, 0/1 and 0/15 % of commercial product of Thyme and Garlic extracts during the 90-d feeding period. Eggs were collected daily. Serum cholesterol, triglyceride,High unit(index of egg quality) and egg production were recorded. The SAS software was used for all statistical analysis. Supplementation of Thyme and Garlic extracts (0/15 %) increased ($p<0/05$) Haugh unit and egg production. Serum cholesterol and triglyceride was lowest with 0/15 % of commercial Thyme and Garlic extracts. It is concluded that supplementation of Thyme and Garlic extracts can increase egg production in laying hens and in the other hand As reduction in serum cholesterol can decrease egg yolk cholesterol in laying hens, it is concluded that supplementation of Thyme and Garlic extracts may provide eggs with lowest cholesterol and reduce the risk of coronary heart diseases in human.

PP-8

Flavonoids from the aerial parts of *Indigofera secundiflora*

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The acetone extract and three flavonoids isolated from the aerial parts of *Indigofera secundiflora* were investigated for antibacterial properties. Both the extract and the isolated flavonoids showed activity, however quercetin [I] showed the least activity, quercetin-3-O-methylether (II) showed significant activity against *Staphylococcus aureus*, while quercetin 3,3',4'-trimethylether (III) showed activity against all the tested pathogens. The presence of methoxy flavonoids might be responsible for the observed anti-bacterial properties.

PP-9

Determination of total antioxidant capacity of *Helianthus annuus l.* By cerac (ceric ion reducing antioxidant capacity method)

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L- Ascorbic acid (AA: vitamin C) is the most important vitamin for human nutrition supplied by fruits and vegetables, and is the main water-soluble antioxidant in human plasma. AA is reversibly oxidised to form dehydroascorbic acid (DHA), which also exhibits biological activity. As a potent antioxidant, AA scavenges reactive oxygen species including superoxide, protects isolated LDL against oxidative modification, and plays an important role in the regulation of intracellular redox status.
CERAC Method is based on the room temperature-oxidation of antioxidant compounds with Ce(IV) sulphate in dilute sulphuric acid solution, and measuring the absorbance of unreacted Ce(IV) at 320nm[1]. *Helianthus annuus L.* are a good source of manganese, magnesium, copper, tryptophan, phosphorous, zinc, selenium, foliate, iron, potassium, calcium, vitamin E, thiamine, vitamin B1, niacin , riboflavin, vitamin B5 and vitamin B6. Traces of Vitamin C and vitamin A can also be found in *Helianthus annuus L.*
The aim of this study was to measure antioxidant capacity of *Helianthus annuus L.*, collected from different regions, by using CERAC Method. The regions were Pehlivankoy, Akarca, Uzunkopru, Alpullu, and Yenikoy. Cold water was tested extracting solvents. Akarca had the highest antioxidant content and Yenikoy had the lowest antioxidant content.

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PP-10

A fraction from *Galega officinalis* manifesting anti-aggregating activity on human platelet aggregation *in vitro*

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Biologically-active substances inhibiting platelet aggregation isolated from medicinal plants are summarized. An extract from the medicinal plant goat rue – *Galega officinalis* L. (*Fabaceae*, *Leguminosae*) manifested powerful anti-aggregating activity. An original scheme for isolation of an active fraction was developed to obtaining of a purified active fraction demonstrating anti-aggregating activity. The fraction inhibits human platelet aggregation initiated by 25 μM adenosine 5'-diphospate, 100 μg/ml collagen, and 0.8 U/ml thrombin with IC_{50} being 11 μg/ml for ADP, and IC_{100} being 15 μg/ml for collagen 20 μg/ml for thrombin, respectively.
Study by flow cytometric assays with monoclonal antibodies CD62P-FITS, specific for P-selectin expression in activated platelet shows that the fraction's active compounds disrupted the fibrinogen bridges between the platelets, responsible for the irreversible aggregation. The isolation of anti-aggregating fraction from *Galega officinalis* L. appears an interesting scientific topic in area of the medical practice.

PP-11

Herbal products for lowering blood lipids

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Among all risk factors of atherosclerosis, dyslipidemia is thought to be the most potent. Some drugs with lipid lowering effects are used, but these can have adverse events. Many herbal products for treatment of hyperlipidemia are present on the market.
Evidence from numerous clinical trials demonstrates that garlic can normalize plasma lipids. However, contradictory results have been reported, as a result of the use of different garlic preparations or inadequate duration of the studies. The results from one clinical study performed recently, using time-released garlic powder tablets in mildly hyperlipidemic men, have shown that this form of garlic tablets promise more potent pharmacological effects.
Evidence from several clinical studies has shown that preparations containing artichoke leaf extract can significantly reduce cholesterol levels. Numerous experimental studies have shown that green tea extract decrease plasma cholesterol in experimental animals. Recently, a great interest has arisen in the lipid lowering effect of berberine. The preliminary findings suggest that the combination of berberine and stanols is a promising approach to the development of a new efficient product that lowers cholesterol and triacylglycerides.
Consumption of herbal products alone can decrease blood lipids, but it cannot be used as the main therapeutic agent for hyperlipidemia.

PP-12

Antimicrobial and influence on gut microflora of garlic (*Allium sativum* L., Alliaceae) extracts

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Wide array of therapeutic effects of garlic (*Allium sativum* L., Alliaceae) such as hypolipidaemic, antiatherosclerotic, hypoglycaemic, anticoagulant, antihypertensive, antimicrobial, and hepatoprotective have been reported. It is generally concerned that these health-related functions are mostly attributed to the rich content of γ-glutamylcysteine in fresh garlic and to the many sulfur-containing compounds formed during storage and processing. However, a variety of additional primary and secondary nonsulfur constituents work synergistically to provide various health benefits, but the real importance of these compounds in explaining the health benefits of garlic remains to be resolved. To our knowledge, there are very few data which characterize the potential antimicrobial properties related to phenolic and flavonoid fractions, and there are no data on their influence on gut microflora. With respect to this, antimicrobial activity on eight bacteria and two fungi and influence of polar extracts of garlic on gut microflora was evaluated. Extracts

were obtained from the immature garlic plant, from grounded and air-dried (prepared as an Aged Garlic Extract) and fresh garlic bulbs, with determined content of total phenolics, and flavonoid glycosides and aglycones. Although extracts exhibited mild antimicrobial, especially antibacterial activity, only the extract prepared as AGE significantly decreased the number of gut microflora.

PP-13

Antıoxidant activity of some *Scorzonera* species

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Scorzonera L. species belonging to the family Compositae are mainly originated from the Mediterranean region and distributed from central Europe to central Asia with more than 175 members. In Turkey, 39 members of *Scorzonera* genus are reported in the Flora of Turkey. In addition with the new species, the number of *Scorzonera* species is increased to 49 *Scorzonera* species are mainly used as a vegetable in Europe as well as in Turkey. This genus plants were also employed as folk medicinal plants in Europe additionally in China and Mongolia. In Turkish folk medicine members of this genus are used to treat a variety of illnesses, including arteriosclerosis, kidney diseases, hypertension, diabetes mellitus and rheumatism as well as for pain relief[1]. In previous phytochemical studies, triterpenes, sesquiterpenes, sesquiterpene lactones, flavonoids, lignans, dihydroisocoumarins and phenolic acids have been isolated from *Scorzonera* species. As well as four triterpene and one sterol as well as two dihydroisocoumarine were isolated from *Scorzonera latifolia* roots by us[2-3]. The importance of phenolic compounds which are commonly found in plants is known according to their antioxidant activities. Since antioxidant constituents are well-known as inducers of cellular and tissue pathogenesis leading to various diseases including cancer, neurodegenerative and cardiovascular diseases, the interest of scientists is raising in recent years[4]. With regard to former bioactivity and phytochemical studies which were carried out with *Scorzonera* species, we examined antioxidant activities of three members of this genus in current study by using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging and superoxide anion scavenging methods. All of the extracts exhibited a scavenging effect on the DPPH and superoxida anion radical with various potencies. The most active one was established to be the extract of *S. latifolia* with an IC_{50} value of 0.035 g/ml and 2.5 mg/ml respectively.

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PP-14

Glycyrrhiza glabra l. Extract and glycyrrhetic acid: efficient antineoplastic agents in new topical formula

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Glycyrrhiza glabra L. (licorice) roots have successfully been used since ancient times to treat ulcers, cough and inflammatory disorders.[1] Recent studies suggested their potential as anticancer agents.[2,3] The present research aimed at evaluating the *in vivo* anti-melanoma activity of topical preparations containing licorice extract and glycyrrhetic acid (the aglycone of the main triterpene saponin). Eight week old C57BL/6J female mice underwent a 4 week session of topical 7,12-dimethylbenzanthracen (tumor initiator) and croton oil (tumor promoter) administration, followed by the application of licorice preparations for 3 weeks. Two gel batches were studied containing 2% *Glycyrrhiza glabra* crude extract, and 2% glycyrrhetic acid, respectively. Their stability was assessed through rheological methods. For the crude extract, grinded licorice roots were subjected to repeated ultrasonication and maceration with methanol at room temperature, until exhaustion of plant material; the combined extracts were evaporated under reduced pressure. Pure glycyrrhetic acid was purchased from Sigma (97% purity). Upon evaluation of erythema and mexametric analysis of skin pigmentation, both gels showed significant decrease of up to 20% of baseline skin pigmentation and reduction of up to 30% of baseline skin erythema. Histological analysis confirmed the positive effects of the tested preparations on the collagenisation of the dermis.

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PP-15

The effect of extraction solvent and temperature on the content of phenolic and antioxidant activity of some forest fruits. Nota 1: *Vaccinium vitis idaeae* fructus

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The effects of five extracting solvents [absolute ethanol, aqueous ethanol (ethanol: water 70-30v/v; 50-50-50v/v; 30-70v/v), and

water] and two extraction techniques (maceration and reflux) on the phenolic content and antioxidant activity of *Vaccinium vitis idaea* fresh fructus extracts were investigated. The total phenolic content was measured by Folin-Ciocalteau assay. Additionally were investigated the anthocyanines, proanthocyanidines, flavonoids and C vitamin contents.
The antioxidant activity was investigated with 2,2-diphenyl-1-picrylhydrazyl radical scavenging method and correlated with TLC technique. The highest DPPH· scavenging activity were found in 50% ethanolic extract, obtained by the refluxing extraction technique.
A positive correlation was observed between total polyphenol content with antioxidant activity.

PP-16

The effect of extraction solvent and temperature on the content of phenolic and antioxidant activity of some forest fruits. Nota 2: *Prunus spinosa* fructus

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The effects of five extracting solvents [absolute ethanol, aqueous ethanol (ethanol: water 70-30v/v; 50-50-50v/v; 30-70v/v,) and water], two extraction techniques (maceration and reflux) and two temperatures (20ºC and 60ºC temperatures) on the phenolic contents and antioxidant activity of *Prunus spinosa* fresh fructus extracts were investigated. The total phenolic content was measured by Folin-Ciocalteau assay. Additionally were investigated the anthocyanines, proanthocyanidines, flavonoids and C Vitamin contents. The antioxidant activity was investigated with 2,2-diphenyl-1-picrylhydrazyl radical scavenging method and correlated with TLC technique.
Results showed that the temperature and extraction solvent mixtures had significant impacts on antioxidant activity estimation, as well as different extraction capacity and selectivity for free phenolic compounds. The highest levels of the scavenging potential (81.0 -85.0 %) correspond to the absolute ethanol with reflux extraction technique and 60ºC work temperature, but not correlated with phenolic compounds content.
A good correlation was obtained for ethanol:water solvent (70-30 v/v) with maceration technique at 20º C work temperature, respectively 0,577 mg/ml total poliphenols (expressed as gallic acid) and the scavenging potential between 7.05-77.0 %.

PP-17

The effect of solvent extraction on the extractibility of some bioactive substances and antioxidant activity of some medicinal herbs indicated for cardiovascular protection note ii: fructus of *Sorbus aucuparia l.*

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The effects of four different solvent systems (water and water-ethanol: 30-70%, 50-50%, 70-30%) with reflux extraction technique on the extractability of phenolics substances (phenolic acids, proanthocyans, flavonoids) and antioxidant activity of fruits of *Sorbus aucuparia L.* were investigated by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. The water-ethanol 70-30% extract exhibited a good antioxidant activity and highest concentration of polyphenolic substances. The highest antioxidant activity was found in water-ethanol 50-50% extract. A correlation was observed between total polyphenolcarboxilic acid contents and antioxidant activity. In addition, some of bioactive phenolic constituents which may contribute largely toward antioxidant potential were evidentiated for their antioxidative properties by TLC with DPPH detection reagent.

PP-18

Protective effects of some flavonoid extracts on *oxidative stress*

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Flavonoids are a group of polyphenolic compounds with known properties which include free radical scavenging, inhibition of hydrolytic and oxidative enzymes and anti-inflammatory action. Flavonoids' antioxidant properties may be explained also by free radicals capture formed in various pathological conditions: anoxia (when the generation of super-oxide radical takes place), inflammations (when super-oxide anions by NADPH-leukocytes' membrane oxidase, hydroxyl radicals and other reactive radicals are produced, which are forming during phagocytosis), lipids auto-oxidation (with hydro-peroxide radical formation).
Many investigations have correlated the pharmacodynamic properties of some plant extracts with their antioxidant activity and the capacity to defend the organism against oxidative stress. This study presents the evaluation of antioxidant activity of some vegetal selective extracts obtained from *Crataegus monogyna* Jacq. Antioxidant properties were studied using the chemiluminescence technique and *ex vivo* lipid peroxidation assay.
A correlation between antioxidant activity and flavonoidic content was observed for all the selective extracts, and a parallel behaviour with the antioxidant activity determinated by *ex vivo* lipid peroxidation assay and *in vitro* chemiluminescence tests was also noted.
The results obtained recommending the selective vegetal extracts from *Crataegus monogyna* Jacq. species for therapeutic purposes.

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PP-19

A comparative study between betulinic acid and betulin in semisolid formulations applied as preventive agents on early stages of melanoma or naevi

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Betulin (lup-20(29)-ene-3β,28-diol, B) and betulinic acid (3beta,

hydroxy-lup-20(29)-en-28-oic acid, BA) are vegetal compounds with lupan skeleton. They are intense studied in the last years for their pharmacological properties such as antitumor, antiinflammatory or antiviral effects. The vegetal sources that contain these compounds are diverse and this could be another reason for development of the studies regarding these two structures. The aim of our work was the analysis of their topical activity in early stages on skin pathology correlated to melanoma because it is known that betulinic acid seems to be active in stages I/II of dysplastic naevi.

We used an experimental model with B6D2F1 mouse (Charles River), female, 8 weeks, that were treated with 7,12-dimethilbenzanthracene as tumor initiator and phorbol esters as tumor promoter. In the 5th week after the treatment with tumor agents the application of semisolid compounds started. The measurements included melanin and erythema evaluation with a Mexameter (Courage & Khazaka) and a histopathological evaluation by haematoxilin-eosin staining.

The preliminary results indicated an important intervention of the 2 type of formulations, especially the one with betulinic acid in pathologic evolution and melanin decreasing or maintaining, over 20%-30% as average. The main conclusion was that lupan skeleton structures such as betulinic acid could be very active as preventive or treatment of dysplastic naevi or early stages of other related pathologies of the skin.

Acknowledgments

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PP-20

On results of pharmacological study of *Aloe arborescens mill* dry juice granules on the trend of experimental enterocolitis

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The drugs received from the leaves of *Aloe Arborescens Mill* are used successfully for treatment of gastro intestinal diseases. Therefore, the influence of Aloe drugs on enterocolitis is not investigated yet. The goal of the study was to receive the granules from dry juice of Aloe and their investigation against enteroclitis. The experiment was provided on 60 sexually matured white male rats of Visar line with initial mass 150-180 grams. Experimental enterocolitis was rendered by intragastric injection of castor oil at a rate 1.0 ml on 100 g of the weight once a day within 3 days. Aqueous solution from *Aloe* dry juice granules was introduced in experimental-therapeutic dose of 300 mg/kg, starting from the 3 day once a day within 7 days. Animals of the control group received the distilled water in accordance of the similar scheme and in equivalent volume. All animals were kept in the same conditions. Examinations were done on the 4,7,10 days from the beginning of experiment. Estimation of medication efficacy was provided due to such criterions as defecation frequency, transport-evacuation function and indirect showings of general acidity changes, free and combined hydrochloric acid, pepsin level in digestive juices. As well, was provided patho-morphological research of intestines / duodenum, small and large intestine /. In the result of provided research was determined that against the background of dry aloe juice introduction the defecation frequency on the 4-th day was decreased 1.5 times, on the 7-th day – 2.5-3 times and on the 10-th day was normalized. During microscopic examination of the rats receiving the medication, on the 4-th day was noted noticeably lower hemodynamic disorders, and more light signs of necrosis and necrobiosis of integumentary epithelium than in control. On the 7-th day in experimental animals was fixed the substantial epithelization of intestinal micro erosions, on the 10-th day the secretor function of intestine in experimental animals was completely restored, whereas in the control group the process of regeneration was just only started.

Thus, the course introduction of Aloe dry juice granules in experimental - therapeutic dose is accompanied with pronounced improvement of intestinal functional conditions and earlier involution of organic changes in the bowels.

PP-21

Radical scavenging and antioxidant activities of methanolic extracts from *Hypericum* species growing in Bulgaria

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Thirteen *Hypericum* species growing in Bulgaria were investigated for free radical-scavenging activity, antioxidant activity, total tannins and total flavonoid contents. Methanolic extracts from the *Hypericum* species were analyzed for radical scavenging and antioxidant activities using DPPH-, ABTS- free radicals, total antioxidant activity (FRAP assay) and inhibition of lipid peroxidation in linoleic acid system by ferric thiocyanate (FTC) method. Butylated hydroxytoluene (BHT) and ascorbic acid were used as positive controls. Methanolic extracts from *H. cerastoides, H. perforatum* and *H. maculatum* demonstrate the highest antioxidant activities and are potential source of natural antioxidant compounds. The quantification of tannins and flavanoids were determinated in *Hypericum* species using Folin-Chiocalteu reagent and $AlCl_3$, respectively. The amounts of the tannins ranged from 1.30 ± 0.01 mg/100 g dw in *H. elegans* to 8.67 ± 0.02 g/100 g dw in *H. perforatum*. The highest concentration of flavonoids was found in *H. cerastoides* (1.22 ± 0.02 g/100g dw) although, the lowest amount was established in *H. olympicum* (0.20 ± 0.03 g/100g dw).

PP-22

Studies on the immunomodulatory effect of *extracts* of *Paronychia argentea* l, and its efficacy to protect chlorpyrifos-induced oxidative stress in rat erythrocytes

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Paronychia argentea Lamb. is extensively used in traditional medicine to treat various diseases in Algeria. The study reported here was focused on the antioxidant and immunological effects of the whole plant extract using n-butanol, as a solvent. The extracts were incubated with macrophages and peripheral blood lymphocytes. Cell cultures were assayed using LTT and MTT techniques. Then the *in vitro* immunomodulatory activities of these extract were studied. The antioxidant and free radical scavenging activities of the extract were evaluated using DPPH (1, 1-diphenyl-2-picrylhydrazyl radical) method. Organophosphorus insecticides may induce oxidative stress leading to generation of free radicals and alteration in erythrocytes membranes.The aim of this study was examine the protective effect of butanolic extract from *Paronychia argentea* Lamb against chlorpyrifos-induced oxidative stress in rat erythrocytes.The present findings established that CE can cause a strong induction in LPO, while treatment by plant extract reduced /or protect CE toxicity. The decrease in LPO levels revealed the antioxidant property of this extract. A significant in vitro antioxidant activity of plant extract was reported. The phagocytic activity of macrophages and peripheral blood lymphocytes proliferation in the presence or absence of mitogen (pokeweed pwm) or (PHA) and chlorpyrifos pesticides were assayed. The present study revealed the antioxidant and immunomodulating activities, which could explain the traditional used of this plant in Algeria.

PP-23

Antimicrobial activity of *Salvia glutinosa* l. From the fruška gora mountain

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Considering its botanical classification (*Lamiaceae-Salvia*), and the fact that *S. glutinosa* from the Fruška Gora Mountain has not been previously investigated, the aim of this study was to investigate antibacterial and antifungal activity of plant extracts of different polarity. Plant extracts ($CHCl_3$, 70%MeOH) were used for *in vitro* experiment in two concentrations. As references, two standard antibiotics (ampicillin, streptomycin) were employed in three concentrations. Antibacterial effect was studied on two G+ (*Streptococcus pyogenes*, *Staphylococcus aureus*) and five G- microorganisms (*Escherichia coli, Schigella flexneri, Salmonella typhimurium, Proteus mirabilis*, *Pseudomonas aeruginosa*). Antimicotic activity was assayed using *Candida albicans*, *Aspergillus flavus*, *A. niger* and *Fusarium sp.* In addition, antimicrobial activity of extracts of sage (*S. officinalis*) was determined, as well. MeOH extract of *S. glutinosa* exibited strong inhibitory effect on *E. coli*, that was equal compared to streptomycin. *S. officinalis* also affected growth of *E. coli* but less expressed. Extracts of *S. officinalis* exibited inhibitory effect against *S. pyogenes*, *S. flexneri* and *P. aeruginosa* as well. Antifungal study showed that extracts of both plants have no effect on *Aspergillus* and *Fusarium* growth, while $CHCl_3$ extracts of both plants exibit inhibitory effect on *Candida albicans*.

PP-24

Polyphenol composition and antioxidant activity of extracts of colored soybean seeds

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Black soybean has long been consumed in Far East as food and medicinal material, and is considered as an important source of natural antioxidants. Commercially grown soybeans have yellow seed but some varieties are self-colored and accumulate anthocyanins. There are few reports on this matter from Asia and USA, but none of them from Europe. Therefore, the aim of this study was to investigate the composition of major polyphenol constituents in extracts of colored soybean seeds, grown in Southeast Europe. One specimen of yellow seeds and seven colored varieties (black, brown, ocher, green and reddish) were chosen for the experiment. 70% acetone seed extracts showed the total polyphenol amount ranged from 2.68-6.22 mg gallic acid equivalent/g dry seeds, being highest in the black varieties. Total tannin content was the lowest in the brown seeds (0.71 mg/g), while the green variety had the highest tannin content (1.55 mg/g). The highest levels of total flavonoids and anthocyanins were recorded in the black seeds (219.0 mg rutin/100 g, and 68.47 mg cynidin-3-O-glucoside/100 g, respectively). In addition, the total phytoestrogene contents and DPPH-radical scavenging activities were also determined. Correlation between polyphenol contents and antioxidant activity was established by regression analysis.

PP-25

Comparative study of antigenotoxicity of plant monoterpenes in prokaryotic and eukaryotic test systems

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It has been shown that active substances from medicinal and aromatic plants possess protective effects against environmental and endogenous mutagens. The aim of this work was to investigate antigenotoxic potential of different compounds from medicinal and aromatic plants in prokaryotic and eukaryotic tests with different end-points. We used reverse mutation assays with *E. coli* K12 and *E. coli* WP2 and Comet assay in human hepatoma HepG2 and B lymphoid NC-NC cells. Antioxidative and bioantimutagenic properties of monoterpenes from sage and basil were measured after *t*-BOOH and 4NQO- and UV-treatment, respectively.

Comparative study with prokaryotic and eukaryotic tests showed that linalool and myrcene possess antioxidative properties and significantly reduce *t*-BOOH-induced genotoxicity, while thujone and camphor significantly reduced 4NQO- and UV-induced genotoxicity. Interestingly, eucalyptol showed potential to reduce genotoxicity of all tested mutagens.

Obtained results indicated that antigenotoxic potential of linalool and myrcene was due to their antioxidativity, antigenotoxic potential of thujone and camphor was due to their bioantimutagenic properties, while eucalyptol reduced genotoxicity by both mechanisms.

Bearing in mind the evolutionary conservation of many cellular functions, including DNA repair and antioxidative protection,

obtained results could be valuable basis for further evaluation of protective potential of sage and basil in eukaryotes, and ultimately in humans.

PP-26

Antioxidant and scavenger capacity of *Datura stramonium* from Vojvodina

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Datura stramonium has a long history of use as a herbal medicine, though it is very poisonous and should be used with extreme caution. The leaves, flowering tops and seeds are anodyne, antiasthmatic antispasmodic, hallucinogenic, hypnotic, mydriatic and narcotic. There are some studies concerning antioxidant activity of *Datura Stramonum* from India, South Africa and Iran. Data concerning antioxidant activities of European *Datura Stramonum* are unknown, and therefore the task of this study was to explore antioxidant activities of leaves and roots of *Datura stramonium* from Balkan Peninsula. Activities of antioxidant enzymes (superoxide dismutase, catalase, peroxidase, glutathione peroxidase), quantities of malonyldialdehyde, superoxide and hydroxyl radicals and reduced glutathione and also the content of chlorophylls a and b, carotenoids, and soluble proteins were determined. Our results indicate that extracts from plant organs exhibited antioxidant activity. The highest antioxidant activity was observed in the leaves. Furthermore, ESR signal of PBN-OH radical adducts in the presence of leaves phosphate buffer (pH 7) extract was reduced for 45.16%.

PP-27

Cytotoxic effects of endemic *Themopsis turcica* extracts on human prostate and myeloid leukemia cell lines

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Thermopsis is a genus represented by only one endemic species in Turkey. The species is *Thermopsis turcica* Kit Tan, Vural & Küçüködük, which is a perennial endemic plant with long rhizome and large flowers. *Thermopsis* species reported to contain alkaloids, flavanoids, vitamin C, macro and microelements. We investigated the cytotoxic effects of ethanol, methanol, ethyl acetate and water extracts of this endemic species on human prostate (DU145, PC-3) and myeloid leukemia cancer cell lines (K-562, HL 60). Cytotoxic effect of the extracts was evaluated on these cell lines using MTT (3-(4,5-dimethyl-thiazoyl)-2,5-diphenyl-SH-tetrazolium bromide) assay. Present results show that ethanol and ethyl acetate extracts of *T. turcica* were toxic on myeloid leukemia cell lines at 80-100mcg/ml concentrations ($p<0.05$, 0.01, respectively). The toxic effect of *T. turcica* in water extract was augmented with higher dosages (1,5-2 mg/ml, $p<0.05$). Whereas no toxic effect was observed on prostate lines with the same concentrations of extracts. No important toxic effect was observed methanol extract of *T. turcica* on all cell lines. As a conclusion, the cytotoxic effect of *T. turcica* on different malignancies should be investigated in animal studies.

PP-28

Antimicrobial and antioxidant activity of three *Anthemis* (l.) Species

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Anthemideae is one of the largest tribes of *Asteraceae,* comprising about 111 genera and ca. 1800 species. *Anthemis* L. represented by 79 taxa in Turkey. *Anthemis* species are used in pharmaceutics, cosmetics and food industry. Some of the species are used for the treatment of hepatitis, activating urinary system, as a sedative. The antimicrobial activity of *Anthemis austriaca* Jacq. *Anthemis altissima* L., *Anthemis coelopoda* Boiss. var *bourgaei* Boiss. were determined by agar-well diffusion method. Antioxidant activities of *Antemis* species were determined by DPPH. Plant samples a showed significant antimicrobial activity against *Bacillus cereus*, *Bacillus subtilis*, *Staphylococcus aureus*, and *Enterococcus fecalis*. However, there was no activity against yeasts. Methanol plant extract showed higher antioxidant activity than ethanol plant extract for DPPH. The results shows that the most effective plant for antioxidant activity was *A. altissima*.

PP-29

Antimicrobial of *Centaurea tchihatcheffii* and *Cynanchum acutum* l.

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Centaurea tchihatcheffii (yanardöner) is a small annual flowering plant belongs to Asteraceae family. It is locally endemic to Gölbaşı in Ankara districts and is Critically Endengered. *Centaurea* is the third largest genus in Turkey. Turkey is one of the main centers of diversity for the genus *Centaurea*. 190 specific and infraspecific taxa of *Centaurea* occur mainly in the Mediterranean and Irano-Turanian regions in Turkey. 148 of them are endemic (78 %). 96 endemic *Centaurea* species are threatened (48 CR, 27 EN and 21 VU). *Centaurea* species are used medicinal purposes. *Cynanchum acutum* L is a wild perennial herb, belongs to Asclepiadaceae family which comprises many medicinal plants. The chloroform, ethanol, methanol acetone extracts of *C. tchihatcheffii* and ethanol extract of *C. acutum* have been screened for antibacterial activity against Gram positive and Gram negative bacteria, and for antifungal activity against yeast strains using agar-well diffusion and disc diffusion methods. All extracts of *C. tchihatcheffii* showed significant antimicrobial activity against *Bacillus cereus* (NRLL B-3008), *Bacillus subtilis* (ATCC 6633), *Staphylococcus aureus* (ATCC 25923), and *P. vulgaris* (ATCC 8427), *Candida albicans* (ATCC 10231) and *Candida tropicalis* (ATCC 13803). However, *C. acutum* showed antimicrobial activity against *Pseudomonas aeroginosa* (ATCC 27853) only.

PP-30

Cytotoxic effects of *Glycyrrhiza flavescens* subsp. *Antalyensis* on b16f10 mouse melanoma cells

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Glycyrrhiza flavescens subsp. *Antalyensis* was described as a novel endemic subspecies from Antalya, Turkey. There are no such reports indicating the cytotoxic activity of *G. flavescens* subsp. *Antalyensis* so the range of pharmacological properties has been mysterious. The cytotoxic effects of leaf and flower aqueous extracts of *G. flavescens* subsp. *Antalyensis* on mouse melanoma cancer cell line, B16F10, were examined via MTT assay and tryphan blue dye exclusion method. Treatment with leaf and flower extracts exhibited significant ($P< 0.05$) cytotoxic effect on B16F10 cells, the viability of the cell was decreased in a dose and time-depended manner for 72 hours with an IC_{50} of approximately 57.39 μg/ml for leaf and 49.95 μg/ml for flower. Activity of caspase-3 and the amount of TNF-α were consistently increased in treated cells compared with non-treated and treated with solvent over 24 hour.

In this study, we proved that both flower and leaf extracts of *G. flavescens* subsp. *Antalyensis* significantly inhibit B16F10 mouse melanoma cancer cells growth, lead to activation of caspase-3, and increase the amount of TNF-α. The results of this study suggest that apoptosis induction may be an important mechanism which aqueous extracts of both flower and leaf parts of *G. flavescens* subsp. *Antalyensis* exert their antiproliferative properties.

PP-31

Beneficial effects of *Aesculus hippocastanum* seed extract on the body's own antioxidant defense system on subacute administration

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Seeds of *Aesculus hippocastanum* L. have been used in European phytotherapy to treat inflammatory and vascular problems. In Turkish folk medicine, tea prepared from the crushed seeds was used to pass kidney stone, while a fraction of seed was swallowed to alleviate hemorrhoids. *In vivo* effects of the escin mixture obtained from ethanol extract of *Aesculus hippocastanum* seed on the blood and tissue antioxidant defense systems in standard pellet diet (SPD) and in high fat diet (HFD) consumed male mice were assessed. Escin mixture was administered orally to male mice fed either standard pellet diet (SPD) or high fat diet (HFD) for five weeks. The tissue and blood samples were collected at the end of the experiment. The effect of the escin mixture on the plasma antioxidant activity; blood and tissue malondialdehyde (MDA) and reduced glutathione (GSH) levels; erythrocyte and tissue superoxide dismutase (SOD) and catalase activity (CAT) in SPD and HFD consumed animals were studied. Escin mixture prohibited the adverse effects of oxidative stress and showed a protective effect on the liver architecture both in SPD and HFD consumed mice. The present results indicate that *Aesculus hippocastanum* increase the antioxidative defense system and prevent HFD-induced lipid peroxidation in male mice.

PP-32

Antimicrobial and antioxidant activities of four *verbascum* species growing in Turkey

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Various *Verbascum* species were previously screened for their antiinflammatory, antimicrobial, antioxidant, antiulcerogenic, antitumor activities (1). The aim of our study was to evaluate the antimicrobial and antioxidant potential of the aerial parts of four new *Verbascum* species namely, *V. bellum*, *V. detersile*, *V. myriocarpum* and *V. pestalozzae*, growing in Turkey. The plant materials were extracted with chloroform, ethyl acetate and methanol using Soxhlet Apparatus for antimicrobial properties. These extracts were assayed against both gram-positive and gram-negative bacteria by microdilution method. The minimum inhibitory concentrations of *Verbascum* species varied between 150-0.59 mg/ml. In general, ethyl acetate extract was effective for *E. coli* (ATCC 259222) at the same concentration (1.88 mg/ml). Ethyl acetate extract of *V. pestalozzae* was the highest effect on *P. aeroginosa (*ATCC 29853, 0.59 mg/ml). The antioxidant capacity of the methanol extracts were examined using DPPH and β-carotene-linoleic acid methods. While *V. pestalozzae* (IC_{50}=18 μg/ml) exhibits the strongest activity in DPPH assay, *V. detersile* and *V. pestalozzae* provided excellent inhibition effect (100%) in the β-caroten-linoleic acid system.

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PP-33

Assessment of anticholinesterase and antioxidant effects of some *Salvia* species from Irano-turanian phytogeographic region

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Salvia genus (Lamiaceae) is represented by totally 95 species in Turkey. The genus is used as infusion for simple disorders in Anatolian folk medicine and has been recorded to be used against memory loss in Europe. Therefore, we aimed to screen inhibitory potentials of 8 *Salvia* species against acetylcholinesterase (AChE) and butrylcholinesterase (BChE), which are the enzymes playing role in pathogenesis of Alzheimer's disease (AD). The dichloromethane, ethyl acetate and ethanol extracts prepared from the aerial parts and roots of *S. bracteata* Banks and Sol., *S. caespitosa* Montbret & Aucher ex Bentham, *S. cryptantha* Montbret & Aucher ex Bentham, *S. indica* L., *S. microstegia* Boiss. & Bal., *S. multicaulis* Vahl, *S. syriaca* L., and *S. verticillata* L. ssp. *verticillata*, which are the elements of Iran-Turan phytogeographic region. *S. caespitosa* was collected from four different locations, while *S. multicaulis* was gathered from two different locations. The extracts were tested for their AChE, BChE inhibitory and antioxidant activities. AChE and BChE inhibitions were evaluated by Ellman

method using ELISA microplate reader at 25, 50, and 100 µg ml^{-1}. Antioxidant activity was determined by 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging test, ferric-reducing antioxidant power (FRAP) assay and Fe^{+2}-ferrozine test system for metal chelating power at 250, 500, 1000 µg ml^{-1}. Total phenol contents of the extracts were determined using Folin-Ciocalteau's reagent, whilst total flavonoid content of the extracts was calculated by aluminum chloride colorimetric method. The results showed that the dichloromethane extract of *S. cryptantha* had the highest AChE inhibition at 100 µg/ml (56.22 %), whereas the rest displayed weak activity in this assay. The ethanol extracts of *S. cryptantha, S. multicaulis,* and *S. caespitosa* showed notable results in FRAP assay, while only the dichloromethane extract of *S. indica* exerted 73.78 % metal chelating power at 1000 µg ml^{-1}. In DPPH assay, most of the extracts displayed significant radical scavenging effect.

PP-34

Aqueous *Zataria multiflura* extract and acute toxoplasmosis

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Toxoplasma gondii is one of the most important apicomplexan parasites of humans and other warm-blooded animals. The use of pyrimethamine plus sulfadiazine is hampered by severe side effects, including allergic reactions and hematotoxicity. We examined aqueous *Zataria multiflura* extract, on tachizoite of *Toxoplasma gondii* in male BALB/c mice.

A total of 60 BALB/c mice were included, and 10000 tachyzoite organisms of the RH strain *Toxoplasma gondii* were given intraperitoneally to 30 mouse. All experimental mice were given *Zataria multiflura* extract intraperitoneally with 100, 500µl single dose 3 hours after infection and the *Zataria multiflura* extract intraperitoneally with 100, 500µl single dose injected to 20 control animals. 100% of mice were survived with all of used doses of *Zataria multiflura* extracts (100, 500µl) at 7 days after infection, but 100% of positive control mice were died ($P<0.001$). Tachyzoites of toxoplasma in the liver and spleen of A500 group were disappeared 60% and 80% respectively.

In comparison of control group with all experimental groups, tachizoites of toxoplasma in the spleen and liver ($P<0.001$) were significantly different. The results show that aqueous *Zataria multiflura* extract are effective on tachyzoites of toxoplasma in mice and probably be effective in the treatment of murine toxoplasmosis.

PP-35

Study of the effect of gliclazide and apple juice on blood sugar level STZ-induced diabetic male mice

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Increase of blood glucose continuing challenge of public health, and increase of mortality values. Several evidences suggest that antioxidants consumption decreased hyperglycemia. In this study, we compared the effect of apple juice and gliclazide on blood glucose level in STZ-induced diabetic mice. In this study, five male mice groups (n=10 for each group) used. Control group (group 1) received normal saline and four groups received STZ (40 mg/kg). One group received STZ only, and three next group consumed apple juice, gliclazide and apple juice+gliclazide orally by gavage for one month. After one month, glucose concentration was measured. In diabetic group glucose concentration was significantly increased ($p<0.05$) compared with control group. Administration of apple juice, gliclazide and apple juice+gliclazide decreased ($p<0.05$) glucose concentration compared with diabetic group. This effect of apple juice is related to antioxidant effects. However, these properties are needed to be more investigated in human.

PP-36

Anti-inflammatory and immunomodulatory activity in some sudanese plants

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Herbal drugs are of major importance in Sudanese folk medicine, traditional medical practices play an important role in Sudan, These metabolic agents can be used to modulate the host natural defense mechanism and restores impaired immune function (Mesaik *et al*., 2004).

Many clinical disorders are closely associated with the immune system, is so necessary in inflammation, leaves extracts from *P. chilensis* and whole plant extract from *Blumea aurita* possess significant anti-inflammatory activity against rat edema after 4 hrs of oral administration of400-100µg of aqueous extract show high inhibition >90% and pain relief condition in compare with 5 mg indomethacin. The methanolic extract of the leaves *P. chilensis* and different extracts from *Blumea aurita* exhibited high inhibition % suppression of the immune system showed remarkable increase in cell oxidative response (proinflammatory) a dose- dependant effect with >90% inhibition at concentration 100 µg. T-cell proliferation the methanol extract of the leave and aqueous extract from *Blumea aurita* show inhibition 99.8±0.1% at 12.5-6.25 µg/ml. Immunosuppressive activity was found significantly ($P < 0.01$).

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PP-37

Investigation of antioxidant properties of *Myrtus communis* fruit

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Myrtus communis (M. communis) is an evergreen scrub, typical of the Mediterranean maquis. It grows spontaneously in many countries. Leaves and fruit of *M. communis* are traditionally used as antiseptic, disinfectant drug and hypoglycaemic agent. Additionally, different parts of this plant find various uses in the food industry, and in the cosmetic industry. Essential oil composition of fruits collected from Turkey (1) and antioxidant activities of fruit collected from Greece (2) were studied.

In this work, fruit of *M. communis* were collected from Manisa province of West Anatolia and used for antioxidant determination. For this, the collected fruit were dried at room temperature and powdered using a coffee mill. The powdered fruit was extracted using two solvents (methanol and water) with different polarities. The solvents of the extracts were removed and the residues were subjected to antioxidant evaluation.
The antioxidant evaluation methods used were: total antioxidant measurement using ferric thiocyanate (FTC) method; total antioxidant activity measurement using cupric ion reducing (CUPRAC) method; measurement of radical scavenging activity using DPPH (DPPH); measurement of reducing power using ascorbic acid as standard; total phenolic determination using Folin-Ciocalteu method; determination of proline content; determination of total anthocyanins.
The results presented in this study suggest that *M. communis* fruit may be evaluated as a very strong radical scavenger.

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PP-38

Diabetic goto-kakizaki rats improved liver mitochondrial oxidative phosphorylation by *Vaccinium myrtillus*

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In this study, the effects of decoctions of *Vaccinium myrtillus* L. (bilberry) leaves were investigated on GK rats, a type 2 diabetes mellitus animal model.
The possible toxic effects of *V. myrtillu*s over mitochondrial respiratory activity indexes were evaluated. Our results show that *V. myrtillus* leaf decoctions presented significant benefits on glycaemic control. Furthermore, GK rats treated during four weeks with *V. myrtillus* decoction presented an improvement of mitochondrial respiratory parameters evaluated (RCR and FCCP stimulated respiration) which could be explained due to mitochondrial biogenesis improvement by quercetins present in *V. myrtillus* leaves.

PP-39

Antimicrobial activity of some sesame (*Sesamum indicum* l.) Population seed oils

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In this study, *in vitro* antimicrobial activity of seed oil samples obtained from nine different sesame (*Sesamum indicum* L.) populations grown in Kilis was investigated. In the study, the antimicrobial activities of extracts obtained from sesame with the help of hexane solvent were measured against to *Staphylococcus aureus* 25523, Enterococcus faecalis 28212, *Escherichia coli* ATCC 25922, *Candida albicans* ATCC 90028, *Aspergillus niger, Aspergillus parasiticus NRRL 2995, Aspergillus oryzae, Aspergillus flavus*, *Penicillium soppii* and *Penicillium italicum* test microorganisms with disc diffusion methods using suitable broth medium.
According to the results, investigated sesame populations showed different antimicrobial activity against to bacteria and microfungi. While the sample taken from population 3 was the most effective against to bacteria and microfungi, the sample collected from population 6 was the least effective against to microorganisms with respect to antimicrobial activity. It was determined that microfungus *Candida albicans* ATCC 90028 was sensitive to the solvent used.

PP-40

Preliminary screening of antioxidant activity and total phenol and flavonoid contents of *Avena sativa* (oat) extracts

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Avena sativa L. (common oat), known as "yulaf" in Turkish, is a species of cereal grains from Poaceae family and universally used as livestock feed as well as foodstuff for human being. The plant has been also reported to possess various biological activities such as sedative, antidepressant, anti-inflammatory, etc. However, our literature survey showed that there are only a few studies on *in vitro* antioxidant activity of this species. For this purpose, we have herein decided to screen several extracts of *A. sativa* cultivated in Turkey for their antioxidant activity. The hexane, ethyl acetate, ethanol, and water extracts of A. sativa were tested by three methods; 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging test, ferric-reducing antioxidant power (FRAP) assay, and Fe^{+2}-ferrozine test system for metal chelating power at 250, 500, 1000 μg ml^{-1} concentrations. Total phenol contents of the extracts were determined using Folin-Ciocalteau's reagent, whilst total flavonoid content of the extracts was calculated by aluminum chloride colorimetric method. The data obtained indicated that all types of the extracts displayed low to moderate antioxidant assays. They had better activity in metal chelating power test, in which the water extract had the highest chelating power (36.68±1.34 %) at 1000 μg ml^{-1}. On the other hand, their total phenol and total flavonoid contents were found to be quite low, which correlates with our antioxidant test results.

PP-41

Antimicrobial activity of zahter extract on *Bacillus cereus* and *Staphylococcus aureus*

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Plants which have been used as medicines over hundreds of years constitute an obvious choice for study. It is interesting to determine whether their traditional uses are supported by actual pharmacological effects or merely based on folklore. Many plants

are used in Turkey in the form of crude extracts, infusions or plasters to treat common infections without any scientific evidence of efficacy. Turkey has shown activity coherent with the use of these plants in folk medicine. In the present study, we studied the antimicrobial effects of zahter (spices mix of nuds) utilizing the wells diffusion method, against *Bacillus cereus* NRRL-B 3711 and *Staphylococcus aureus* 25923. The methanolic extracts of zahter have been used at the concentrations of 50-100 mg/ml and added to Muller Hinton agar plate wells. For the negative control 100 % DMSO was added to the wells. The results showed that the extract of Zahter possess strong *in vitro* antibacterial activity against the bacteria tested.

PP-42

An exploration of the herbal medicines in multiple sclerosis treatment

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Multiple sclerosis is a chronic disease of the central nerves system. MS is the major cause of non-traumatic disability in young adults. MS imposes a large economic burden on patients and society. The use of complementary and alternative medicine (CAM) considerably is increasing in the world. Americans spend approximately $5 billion yearly for herbal therapies. Evidently, in the field of neurological disease such as MS, CAM is becoming more and more common. According to MS strike during a person's most economically productive and active years and during the period when major life decisions are made, providing health services including an appropriate treatment (less expensive with slight side effects) is an important mission of National Health Service. Comparatively, the treatment with traditional medicines is less expensive and associated with low uncomfortable side effects. The immune-stimulating popular herbs such as *Echinacea*, *Astragalus*, Asian ginseng, Siberian ginseng, and garlic with stimulate macrophages and T cells effect are used by MS patients. St. John's wort, valerian, cranberry, and *Ginkgo biloba* and *Cannabis* are described as "MS-relevance favored herbs". Multiple Sclerosis patients often suffer from stiffness, spasms, pain, and tremor. Apparently, much evidence suggests that cannabinoids could help in these symptoms.

PP-43

Antioxidant and antibacterial activities of methanolic *Capparis spinosa* leaf extract

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The present study describes the *in vitro* antioxidant and antimicrobial activities of methanolic etract of *Capparis spinosa* leaves. The antioxidant properties were evaluated by using 1,1-diphenyl-2-picrylhydrazyl (DPPH) test and the measurement of the metal-chelating activity. The antimicrobial activity of the above extract was also tested against three pathogenic bacterias; *E. coli* MC 4100, *Pseudomonas diminutus* and *Paracoccus paratrophys*; using disc-diffusion method. Results showed that the extract exerted a strong scavenging activity against DPPH radical with IC_{50} values of 56,25 μg/ml, and showed also an excellent metal chelating activity toward ferrous ions with IC_{50} values of 184,78 μg/ml. Furthermore, the methanolic extract of Capparis spinosa leaves showed appreciable antibacterial properties against pathogenic strains. The mean inhibition zones were 0.7, 1.03, and 1.75 mm against *E. coli* MC 4100, *Pseudomonas diminutus* and *Paracoccus paratrophys*, respectively. These findings suggest that *Capparis spinosa* may be considered as an interesting source of antioxidants and antibiotics for therapeutic or nutraceutical industries and for food manufactures.

PP-44

Antioxidant activity and total phenolic content of leaves of *Lawsonia inermis* from Iran

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Henna (*Lawsonia inermis*) is known throughout the world as a cosmetic agent, anticarciogenic, anti-inflammatory, analgesic and antipyretic.[1] The present study is an attempt to evaluate the utility of henna leaf extract as a source of natural antioxidants. Different solvents were used to prepare extracts of henna leaves. The effect of addition of henna leaf extract on the stability of soybean oil was studied by spectrophotometrically by the Folin-Ciocalteu method and was recorded as tannic acid equivalents[2] The antioxidant activity of methanolic and water extracts was determined with 2-thiobarbituric acid, in addition to peroxide values determined by the rancimat method at 90°C, 120 °C and 150°C. The synthetic antioxidants, BHA, BHT and TBHQ, were used at various concentrations for comparison with the extracts. BHA and BHT at 200 ppm and methanolic extract at 800 ppm and at 1400 ppm had equal TBA (2-thiobarbituric acid) and PV (peroxide) values. Both the extracts and the synthetic antioxidants were compared at different concentrations using the rancimat method.

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PP-45

Effect of two extraction methods on the antioxidant activity of henna (*Lawsonia inermis*) leaves

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Henna (*Lawsonia inermis*) is known throughout the world as a cosmetic agent, anticarcinogenic, anti-inflammatory, analgesic and antipyretic.[1] The present study is an attempt to evaluate the utilization of Henna leaves extract as a source of natural antioxidants. Different solvents including methanol, ethanol, acetone, chloroform, hexane and water were used to prepare extracts of henna leaves. Attempts were also made by two different solvent extraction methods (percolation and ultrasound-assisted) with methanol and water. Higher yields

of extract were obtained by water extraction in comparison with methanol extraction. Total phenolic compounds in the extracts were determined spectrophotometrically by the Folin-Ciocalteu method and were recorded as tannic acid equivalents.[2] The methanol extract showed a higher yield of phenolic compounds.[2] In addition, sonication increased the yield of phenolic compounds in the extracts and shortened the extraction time.

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PP-46

Antioxidant activity of *Carthamus tinctorius* L. Flowers

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Carthamus tinctorius L. (safflower) belongs to the Asteraceae family. The genus comprises 19 species, of which six are found in Iran.[1] The flower of safflower is used in folk medicine as menstruation analgesic, antiphlogistic, sexual stimulant, tonic, antimeteorism and antiseptic as well as a source of natural colorants.[2] In the present investigation, we studied antioxidant activity of flowers of four varieties of safflower from Iran called IL-lll, padideh, Isfahan – 28 and mahali koseh isfahan. The antioxidant potential of flowers was evaluated using in vitro methods such as total phenolic content (Folin-Ciocalteau method), scavenging of 2,2-diphenyl-1-picrylhydrazyl radical (DPPH assay) and total flavonoid content (spectrophotometric method).
Total phenolic contents were , 62.3, 57.4, 52.6 and 46.2 mg GAE *per* gr dry weight extract, The values of IC_{50} in DPPH assay were 232.8, 245.1 , 267.3 and 299.0 ppm and total flavonoids were 9.6, 8.6, 8.0 and 7.5 mg CE per gr dry weight extract for above mentioned varieties, respectively. Results indicated high antioxidant potential for methanolic extracts of IL-lll, padideh, Isfahan–28 and mahali koseh Isfahan, while antioxidant activity of varieties decreases respectively.

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PP-47

Antioxidant effect of methanolic extract of *Carthamus tinctorius* L. Flowers on soybean oil stability

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Carthamus tinctorius L. (safflower) belongs to the Asteraceae family. The genus comprises 19 species, of which six are found in Iran.[1] The flower of safflower is used in folk medicine as menstruation analgesic, antiphlogistic, tonic, antimeteorism and antiseptic as well as a source of natural colorants.[2]
This study was conducted in order to assess antioxidant activity of extracts from flowers of two Iranian safflower varieties including IL-111 and Mahali (Koseh Isfahan) in soybean oil. In addition phenolic compounds of IL-111 were analyzed using HPLC. The flowers were dried and extracted with methanol (80%). Extracts were concentrated at 40°C and added to refined, bleached and deodorized soybean oil at 200, 400, 800 and 1600 ppm. The oil samples were stored in a 60°C oven and their peroxide and thiobarbituric acid values were measured for 28 days. The oil samples contain 800 ppm of extract showed best antioxidant activity while the 1600 ppm containing samples showed reverse results even higher than control at 28th day. Peroxide and thiobarbituric values of control were 95.20 and 0.4817 whereas these values were 47.30 and 0.2540 for IL-111 and also 49.37 and 0.2840 for Mahali (Koseh Isfahan) respectively. HPLC showed that gallic acid, p-coumaric acid, caffeic acid and ferulic acid were the major phenolic compounds of IL-111 extract with 28.52, 12.74, 2.91 and 2.36 mg/100 g of dried herb, respectively.

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PP-48

Antimicrobial activity of şüdüt, a traditional herbal mixture

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Herbal mixtures of various medicinal plants with honey have widely been used in traditional medicine for curing some ailments all over the world. "Şüdüt", a mixture of cinnamon, nutmeg, ginger, clove, black pepper and allspice, has been used by mixing with honey in southeastern part of Turkey to heal birth wounds of new mother and bring more milk and to resist people for winter illnesses like flue and cough. In order to analyze biological activity of this herbal mixture, polar and non-polar extracts were prepared from the mixture. Antimicrobial activities of pure honey and the şüdüt spice extracts have separately been analyzed by using wells method. *Salmonella* sp., *Klebsiell*a sp., *E. coli* and Methicillin-resistant *Staphylococcus aereus* strains were used at 25, 50, 75, 100 and 150 microlitres to investigate the antimicrobial activities of the extracts and honey. For the negative control, 100 % DMSO was also added to the wells. According to our results the extracts of Şüdüt and honey possess strong *in vitro* antibacterial activity against the bacteria tested. The present study is a good example for investigating the scientific base of traditionally and popularly used medicinal plants.

PP-49

Evaluation of antioxidant activity of *Sideritis trojana* Bornm. ethanol extracts

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Almost all current medicines originally derived from medicinal plants. The value of medicinal plants as herbal remedies is quite

popular among Turkish people. The use of meant and lemon is very old to cure common cold. There are so many other herbs and spices for medicinal purposes. *Sideritis* species (Fam. Lamiaceae), are known as "dağ çayı" (Mountain tea), is used as tea among Turkish people. The plants are distirubuted Mediteranian region in Turkey. The genus represented with 45 taxa in Turkey, 39 of them are endemic. *Sideritis trojana* is only grown in Kaz Dağı, Turkey and the local name of the plant is "sarıkız çayı". *Sideritis* species have strong antimicrobial and antioxidant activity. The plant extracts are rich in phenolic compounds such as hydroxycinnamic acids and flavonoids. *Sideritis trojana* is one of the Turkish endemic plants. Antioxidant activities of *Sideritis trojana* were determined by DPPH and reduction power. BHT and gallic acid were used for positive control. The aerial parts of plants were used for the antioxidant activities. The results show that the plant has secondary metabolites which are phenolics and has got strong antioxidant activity.

PP-50

The benefits of ginger

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Ginger has long been renowned for its use in cooking and for its aromatic smell, but there are also many health benefits of ginger root such as curing nausea and helping with digestion.
Ginger is a plant that comes from Southeast Asia, and is now also cultivated in Jamaica and other tropical areas. The ginger herb root is used for culinary and medicinal purposes. Ginger is a natural spice and is known worldwide for its smell and pungent taste. Ginger has been used by Chinese herbalists for more than 2,500 years as flavoring in food and also as a medicine. There is a wide range of benefits of ginger such as nausea, digestive problems, circulation and arthritis. Nausea caused during pregnancy or by travelling is one of the benefits of ginger root. Ginger is also known to have the ability to calm an upset stomach and to promote the flow of bile. Stomach cramps can be eased and circulation can also be improved. Ginger supports a healthy cardiovascular system by making platelets less sticky which in turn reduces circulatory problems. Ginger oil used for massage can help relieve painful arthritis due to its anti-inflammatory properties. Ginger is often included in many herbal decongestants and can help to minimize the symptoms of respiratory conditions, colds and allergies. With all the benefits of ginger and continuing research, the ginger root is fast becoming a very popular medicinal herb.

PP-51

The protective effect of *Olea europaea* feeding on serum glucose and lipids and enzymes aspartate and alanine aminotranferases in streptozotocin-diabetic rats

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Diabetes mellitus is a common metabolic disorder. From the past, *Olea europaea* has been known for its diuretic and hypoglycemic effects and reduction of blood cholesterol and uric acid and its positive effect on weight gain. Its leaves could prevent acute hypertension and improve insulin resistance in experimental animals. In this study, the effect of oral administration of *Olea europaea* on serum glucose, triglyceride, total cholesterol, HDL- and LDL-cholesterol and level of hepatic enzymes aspartate aminotransferase and alanine aminotransferase was investigated in control, diabetic, and treated control and diabetic groups. Male Wistar rats (n = 40) were divided into 4 groups, i.e. control, pretreated control, diabetic, and pretreated diabetic groups. Pretreatment with *Olea europaea* continued for 1 month and then some rats were made diabetic and treatment continued for 6 weeks. Single dose streptozotocin (60 mg/kg, i.p.) was used for diabetes induction. Serum factors were determined before the study and at 3rd and 6th weeks after the study using biochemical kits for spectrophotometric method.
Serum glucose level showed a 9 % reduction in olive treated diabetic group at 3rd week relative to untreated diabetics. TG and LDL-cholesterol levels significantly decreased 77 % and 90% in olive treated diabetic group at 6th week relative to untreated diabetics. In addition, HDL-cholesterol increased 59 % in olive treated diabetic group at 6th week relative to untreated diabetics ($p<0.005$). In pretreated group, only HDL-cholesterol showed a significant improvement ($P<0.05$). Regarding AST level at 3rd and 6th weeks, there were no significant changes between the groups. For ALT, its level was 23.8 % higher at 3rd week in untreated diabetic group as compared to control and treatment of diabetic group reduced its level by 48.1 % at the same week. Meanwhile, there were no significant changes between groups for ALT at 6th week. In addition, Treatment of control rats caused a 22.6 % and 16.4 % reduction in ALT at 3rd and 6th weeks versus untreated control.
Oral chronic feeding of *O. europaea* has a hypoglycemic and weight lowering effect and leads to reduction of serum TG and LDL-cholesterol and increase HDL-cholesterol in diabetic rats. In addition, it exerts protective effect on serum HDL-cholesterol and reduces serum level of ALT and has no effect on serum AST.

PP-52

Antioxidant and antimicrobial activities of *Berberis vulgaris* leaves

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Reactive oxygen species (ROS) are involved in the organism's vital activities including phagocytosis, regulation of cell proliferation, intracellular signaling and synthesis of biologically active compounds and ATP. With an insufficiency of the antioxidant protective system or under an intense influence of radical-initiating factors, ROS are overproduced and oxidative stress develops. Oxidative stress is a specific feature in the pathogenesis of various diseases, including cancer, cardiovascular diseases, diabetes, tumors, rheumatoid arthritis and epilepsy(1,2).In order to prolong the storage stability of foods and to reduce damage to the human body, synthetic antioxidants are used for industrial processing. But according to toxicologists and nutritionists, side effects of some synthetic antioxidants, such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), are of concern. Many antibiotics have more effect to destroy the bacteria as well as produce side effects. In order to reduce side effects of some drugs the need of traditional medicine is increase because naturally occurring medicine does not produce any hazards to health (3). The study was undertaken to perform

the screening of antioxidant and antimicrobial activities of *Berberis vulgaris* L. leaves using water, ethanol, and ether extract. Free radical scavenging activity of plant extract was determined by using a stable free radical, DPPH. The highest antioxidant activity was found in the water extract. The reducing power of the water extract was the highest, but its reducing power was markedly lower than that of ascorbic acid. The highest DPPH radical-scavenging activity was found in the water, with 50% DPPH radical scavenging at a concentration of 170.12 μgmL^{-1}. The ethanol and hexane extract showed antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, and *Candida tropicalis*.

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PP-53

Bioassay guided isolation of secondary metabolites from *Gypsophila trichotoma* wend

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The *Gypsophila* species are well known by their medicinal, decorative and industrial application. The plants are studied for saponins, flavonoids, sterols, cyclopeptides, organic acids and others. It is well accepted that the major pharmacological effects of *Gypsophila* species are mainly due to the presence of saponins. *Gypsophila* saponins have anticarcinogenic properties, including direct cytotoxicity, immune-modulating effects, and normalization of carcinogen induced cell proliferation, cytoprotective effect over hepatocytes.

Gypsophila trichotoma Wend. (Caryophyllaceae) is a perennial herb, located in Southeast Europe (from East Bulgaria to Southeast Russia). Previous phytochemical investigations of *Gypsophila trichotoma* resulted principally in the isolation of triterpene saponins, as well as flavonoids and sterols.

The aim of the study is bioassay guided isolation of secondary metabolites from *G. trichotoma* roots. Purified fractions were obtained from butanol extract by column chromatography over different sorbents. Obtained fractions were tested for cytotoxic activity in a panel of human tumor cell lines after 48 h, using the MTT-dye reduction assay. The human tumour cell lines which were used in the study are: BV-173 (B-cell leukemia), SKW-3 (T-cell leukemia), HL-60 (acute myeloid leukemia), HL-60-DOX (cell line, derived from HL-60, resistant to doxorubicin), K-562 (chronic myeloid leukemia in blast crisis), MDA-MB-231 (breast carcinoma) and HT-29 (colon adenocarcinoma). Only active fractions were further purified. The purified fractions, containing mostly saponins exhibited the best antitumor activity.

PP-54

Electropharmacogram of taxifolin based on field potential analyis in the freely moving rat in comparison to synthetic reference drugs

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Recording of field potentials from four different brain regions of freely moving rats has gained much insight into the action of synthetic drugs of different pharmacological categories. Quantitative assessment of the data by Fast Fourier Transformation revealed electropharmacograms with time and dose dependent changes of the frequency pattern of drugs prescibed for different clinical indications. The aim of the present investigation was to use this matrix of reference drugs in order to classify the plant-derived ingredient taxifolin (dihydroquercetin) with respect to a possible action on the brain. A group of 6 rats were instrumentalized with a remanufactured set of 4 bipolar concentric electrodes. Field potentials were transmitted wirelessly. Three dosages (10, 20, and 40mg/kg) were administered orally after 45 min of reference recording. Dose dependent decreases of electric power were observed in all frequencies for the next 5 hours in all four brain areas reaching the maximum during the last hour in the hippocampus. Discriminant analysis of the electropharmacograms with 24 variables (four brain areas x 6 frequency ranges) revealed greatest similarity to the antidepressive drugs imipramine and memantine, whereas the highest dosage showed greatest similarity to the effects of galanthamine and selegiline, two drugs used to treat degenerative disorders.

PP-55

The use of gum arabic fractions as dietary fiber supplement for chronic renal failure patients

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Gum Arabic from Acacia senegal (Wild) has been fractionated by foaming method into two fractions, high protein fraction (fraction H) that represents 30% of the gum and a low protein fraction (fraction L) which represents 70% of the gum. A comparative study of the crude gum and the two fractions was carried out in the scope of their effects when 25g/day of each was given to chronic renal failure patients on low protein diet and conservative management for four weeks. Non-protein nitrogenous (NPN) compounds (blood urea nitrogen, creatinine and uric acid), total protein, albumin, electrolytes (P^{5+}, Ca^{++}), haemoglobin and packed cell volume (PCV) were monitored.

The effect of supplementation of chronic renal failure patients with crude gum, fraction H and L for four weeks revealed that fraction L had significant effect in decreasing level of blood urea nitrogen (41.6%), creatinine (23%), uric acid (16%) and P^{5+} (12.3%), and also it had significant effect in increasing level of blood Ca^{++} (9.5%). The result shows that fraction L had no significant effect in the level of haemoglobin, PCV, total protein and albumin.

PP-56

Potential role of *Colutea cilicica* Boiss. & Bal. on *in vivo* wound models

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Leaves and fruits of *Colutea cilicica* Boiss. & Bal. have been used to heal inflammatory wounds at traditional medicine in various parts of Turkey. For the evaluation of the wound healing activity of the plant, the aqueous extracts were prepared from the flowering parts and fruits of *Colutea cilicica* Boiss. & Bal. Incision model by using tensiometer on rats and excision model on mice were employed to assess the activity. Significant wound healing activity was observed with the ointment formulation of the aqueous extract at 1% concentration. The fruit extract treated groups of animals showed 78.1 % contraction, which was close to contraction value of the reference drug Madecassol® (100 %). The same extract on incision wound model demonstrated a significant increase (42.0%) in wound tensile strength as compared to flowering aerial parts. The results of histopathological examination also supported the outcome of both incision and excision wound models. Moreover, zinc and vitamin C levels of the fruit (94.80±0mcg/g; 3.89mg/g) and flowering aerial part (66.09±1mcg/g; 4.04mg/g) extracts that might have contribution to the wound healing process were determined. The experimental data confirmed the traditional usage of *C. cilicica* Bois*s.* & Bal.

PP-57

Prenylated flavones from some Indonesian *Artocarpus* and their antimalarial properties

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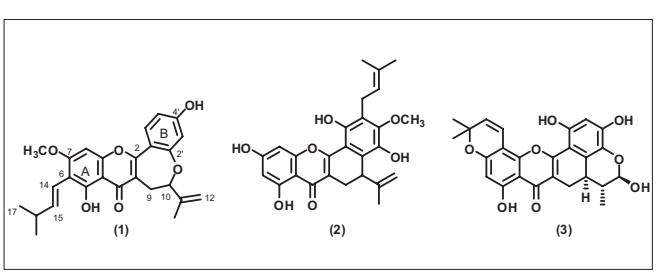
Artocarpus, locally known as "nangka-nangkaan", is one of the important genera of family Moraceae. The plants belong to this genus grow endemically and also cultivated so that the plants are widely distributed throughout Indonesian region. in this report a phytochemical study on three species of *Artocarpus*, namely *A. heterophyllus*, *A. elasticus* and *A. lanceifolius*, has been carried out, and the biological effects of the isolated compounds against *Plasmodium palcifarum* strain K1 and 3D7 have been evaluated. The phytochemical investigation of these plants resulted, three new prenylated flavones, trivially named artoindonesianin E-1 (1), artoindonesianin Z-4 (2) and artoindonesianin Z-5 (3), beside seventeen known prenylated flavones, namely; gemichalcone A, gemichalcone B, morachalcone A, norartocarpanone, artocarpanone, dihydromorin, norartocarpetin, artocarpesin, cycloartocarpesin, cudraflavone C, artocarpin, artonin E, 12-hydroxyartonin E, cycloartocarpin, isocyclomorusin, artobiloxanthone, and cycloartobiloxanthone. Antimalarial effect of some selected isolated flavone derivatives showed that artonin E exhibited very strong inhibition (IC_{50} 0.1 μg/mL) against K1 strain, but only strong inhibition (IC_{50} 0.3 μg/mL) against 3D7 strain of *P. falciparum*. A related prenylated flavone, namely 12-hydroxyartonin E, exhibited strong inhibition (IC_{50} 0.9 μg/mL) against K1 strain, but weak inhibition (IC_{50} 14.3 g/mL) against 3D7 strain. Those two compounds were the member of 3-prenylflavone type. In addition, the other isolated flavone derivatives showed moderate inhibition with IC_{50} respectively 2.1, 1.6, 3.6, 1.3, 6.7 and 2.1 μg/mL against both two strain of *P. falciparum*, except that a flavanone-3-ol derivative (dihydromorin**)**, disclosed inactivity.



PP-58

Antioxidant secondary metabolites from *Verbascum mucronatum* lam.

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A number of the Scrophulariaceae are valued for their curative properties and are widely employed both in domestic and regular medicine. The generic name of this plant, *Verbascum*, is believed to be a corruption of *barbascum*, from the Latin *barba*, meaning a beard, referring to the shaggy appearance of the genus[1]. *Verbascum* (Mullein) genus is represented by 232 species, 196 of which are endemic in Turkish Flora[2, 3]. These plants are known as "sığırkuyruğu" in Anatolia. Historically, mullein has been used as a remedy for the respiratory tract, particularly in cases of irritating coughs with bronchial congestion. Some herbal texts extend the therapeutic use to pneumonia and asthma. The flowers and leaves are mildly diuretic and have a soothing and anti-inflammatory effect on the urinary tract. The leaves, roots and the flowers are also anodyne, antiseptic, antispasmodic, astringent, emollient, nervine, vulnerary, analgesic, antihistaminic, anticancer, antioxidant, antiviral, bactericide, cardiodepressant, oestrogenic, fungicide, hypnotic and sedative[1]**.** Our previous studies have resulted in the isolation of iridoids, phenylethanoids, flavonoids and saponins from *V. lasianthum, V. pterocalycinum, V. cilicicum* and *V. salviifolium*[4]. Our ongoing studies on *Verbascum* species, we worked phytochemical investigations on *Verbascum mucronatum* Lam. which used as hemostatic[5], growing in Center Anatolia and belongs to Group K. The powdered aerial parts of *V. mucronatum* were extracted with methanol. Chromatographic studies on the water soluble parts of the methanolic extract resulted in the isolation of iridoids; aucubin (**1**), catalpol (**2**), ajugol (**3**), phenylethanoid; verbascoside (**4**) and saponins; ilwensisaponin A (**5**) and C (**6**). The structures of all compounds were established by means of spectral evidence (NMR). Antioxidant activity was evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging and ferrous ion-chelating power tests. Ferric-reducing antioxidant power (FRAP) of *Verbascum mucronatum* flowers, its fractions and pure compounds were also tested at 62.5, 125 and 250 μg ml^{-1} concentrations. The methanol extract, fractions D and D4 as well as verbascoside (**4**) exerted significant DPPH scavenger effect and had also moderate FRAP. Besides these, fraction D3 had ferrous ion-chelating effect[6].

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PP-59

Total antioxidant capacity of culinary herbs

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Four species of culinary herbs (*Ocimum basilicum* ´Ohře´, *Satureja hortensis*, *Anethum graveolens* ´Hanák´, *Majorana hortensis* ´Mariette´ and *Thymus vulgaris*) were analysed for total antioxidant capacity (TAC) in fresh stage by using two analytical methods: ferric reducing/antioxidant power (FRAP) and the method based on an antioxidant-sensitive inhibition of a photo-induced chemiluminescence accompanied autoxidation of luminol. Plants for analysis were grown on the experimental field of Faculty of Horticulture in Lednice (Czech Republic). Results from two harvest (9.7. 2009 and 6.8.2009) were compared. There were found no significant differences in TAC depending on the harvest date, but there were found significant differences in TAC between species. TAC, measured using FRAP method, ranged from 112.9 mg of gallic acid equivalents (GAE) per 100 g of fresh weight (*Anethum graveolens*) to 392.3 mg GAE.100g^{-1} fw (*Majorana hortensis*). TAC, measured using photochemiluminescent detection, was the lowest by *Ocimum basilicum* ´Ohře´ (0.901 g trolox.100 g^{-1}fw) and the highest by *Thymus vulgaris* (1.459 g trolox.100 g^{-1}fw).

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PP-60

Antibacterial and immuno-modulatory activity of ethanol extracts from *Lespedeza* spp. *Helicobactor pylori* infections

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Chemical therapeutics targeted against *H. pylori* may lead to host toxicity and pathogen eradication failures. In this study ethanolic extracts from five *Lespedeza* sp. plants have been shown to inhibit gastric-pathogen *H. pylori* and also modulate the cytokine production. Disc agar diffusion assays showed that *Lespedeza* sp. ethanol extracts possess potent anti-*H pylori* activity. Among the five plant extracts, the extracts from *L. cyrtobotrya* demonstrated the highest anti-*H. pylori* effect. The growth inhibitory effect on *H. pylori* was initiated after six hour of treatment with plant extracts; the effect remained continuous for a period of 48 hours. Incubation of the gastric cells infected with *H. pylori* with 1.25 to 50 mg/ml of *Lespedeza* sp plant extracts, resulted in reduction in the production of cytokine IL-8. The plant ethanol extracts generally had little influence on AGS cell viability, thereby indicating their safety in treatment of bacterial infections. The ethanol fractions of *L. cuneata* also demonstrated similar anti-*H. pylori* and immuno-modulatory effects. These results thus provide evidence that *Lespedeza* spp. plant extracts might be potential sources of new host friendly *anti-H. pylori* agents.

PP-61

Antibacterial and immuno-modulatory activity of ethanol extracts from *Lespedeza* spp. *Helicobactor pylori* infections

H.D. Yeo[1], S.C. Baik[2], J.Y. Jung[1], B.M. Kim[1], M.J. Jeong[1], C.H. Lee[3], M.S. Choi[1], J.K. Yang[1]
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PP-62

Antioxidant activity of herbal extracts

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The ability of infusions from the aerial parts of *Agrimonia eupatoria* L., the leaves of *Fragaria vesca* L., *Rubus idaeus* L. and *Rubus fruticosus* L. to act as a scavenger of DPPH radical and superoxide radical was investigated. The epigallocatechin gallate, (-) epicatechin and (+) catechnin were used as standards.
All tested infusions act as antioxidants with different intensity. The high activity towards DPPH radical exhibited *Agrimoniae herba* (IC_{50} = 91,95 μg/ml), towards superoxide radical *Fragariae folim* (IC_{25} = 33,60 μg/ml). The most effective antioxidant was epigallocatechin gallate ($IC_{50\ DPPH}$ = 3,45 μg/ml resp. $IC_{25\ superoxide}$ = 6,30 μg/ml).

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PP-63

The biological activity of *Leonurus cardiaca* extract

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Motherwort has been traditionally used to treat of various cardiovascular diseases which, in most cases, are associated with the dysfunction of mitochondria – main producers of ATP in the cardiac muscle cells.

The aim of this study was to investigate *in vitro* the influence of *Leonurus* extract (LE) on isolated rat heart mitochondrial respiration in different metabolic states using different espiratory substrates reflecting activity of mitochondrial enzyme systems of different complexity. The mitochondria of rat heart were isolated and the mitochondrial respiratory rates were determined oxygraphically by means of Clark-type electrode system. In experiments we investigated the effect of various concentrations of LE extract (1.4 ng/ml – 439 ng/ml of rutin) on heart mitochondrial respiration with complex–I dependent substrates pyruvate+malate, with the oxidation of FAD–specific substrate succinate and the main respiratory substrate of the heart palmitoyl –L-carnitine.

Our findings demonstrate that LE at concentrations (164.7 ng/ml –439.2 ng/ml) partially increase the permeability of the inner mitochondrial membrane to ions and partially uncoupled oxidative phosphorylation in mitochondria. We hypothesize that partial mitochondrial uncoupling could reduce the generation of free radicals within mitochondria and could play an important role in cardioprotection via ROS-dependent pathway. LE at concentration 164.7 ng/ml of rutin and higher increased the State 2 respiration rate and reduced the maximal ADP stimulated mitochondrial respiration rate due to the inhibition of mitochondrial respiratory chain.

PP-64

Preparing the formulation of medicinal cream with *calendula* extract

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The aim of this work was to develop the technology of medicinal cream with *Calendula* extract, and to evaluate the dispersion, stability, and antioxidant activity of this cream using chemical and biological techniques. The concentration of *Calendula* extract in the cream was selected by applying chemical and biological techniques. The quality of the cream was evaluated by examining its stability *via* differential centrifuging and long-term observation using microscopic analysis. The base of the cream was selected taking into consideration the compatibility of its chemical components and their ability to increase the stability of the preparation. We have found that *Calendula* extract containing 0.75mg % of carotenoids calculated as β-carotene, has an antioxidant effect.

The application of a compound emulsifier – a combination of trolamine stearate and glycerol monostearate – statistically significantly increased the stability of the creams during differential centrifuging, compared to the separate application of each of these emulsifiers. The composition of the cream selected during differential centrifuging and microscopic analysis remained stable during long-term observation, and thus these techniques may be applied for the examination of the stability of creams. Chemical and biological examinations of antioxidant activity showed that the concentration of Calendula extract in the cream had an antioxidant effect, which indicates that this cream strengthens protective functions of the skin, reduces transepidermal moisture loss, and promotes skin regeneration.

PP-65

Differentiation induction in k562 cells upon treatment with *gnidilatimonoein*

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Inosine 5' monophosphate dehydrogenase (IMPDH) catalyzes the rate-limiting reaction of de novo guanosine 5' triphosphate (GTP) biosynthesis at the IMP metabolic branch point. Inhibitors of IMPDH promote induction of differentiation by reduction of intracellular GTP levels in a variety of cancer cells. In this study, we investigated the ability of *Gnidilatimonoein*, a diterpene ester from Daphne mucronata, with antiproliferative activity to induce differentiation among K562 cells. Exposure of the cells to different concentrations of the drug for 48 h decreased the intracellular GTP levels (using HPLC analyses) and induced differentiation in K562 cells dose dependently. K562 cells underwent megakaryocytic lineage based on the morphological changes after Wright- Gimsa staining, and the expression of cell surface marker glycoprotein IIb as analyzed by flow cytometry. These changes became evident when the intracellular GTP levels declined by about 30-40% with respect to the control cells. The cell surface content of GPIIb (CD41) increased by 7, 16 and 23% after exposing the cells to a single dose of the drug (1.5 μM) for 24, 48 and 72 h, respectively. In order to confirm the megakaryocytic but not the erythroid differentiation of the treated K562 cells, we measured the glycophorin A content of the cells after 72 h of treatment. Based on the flow cytometry analyses, the cell surface of the treated cells were devoid of a measurable content of glycophorin A. The high differentiation potency of *Gnidilatimonoein*, at very low concentrational level, makes this diterpene ester, a valuable agent for further chemotherapeutical evaluations.

PP-66

Effect of ethanolic extract and powder of *Eucalyptus* on moth *Phthorimaea oprcullela*

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The study was conducted out at labs of Biocontrol Research Unit (BRU), College of Agriculture, University of Baghdad to estimate the role of ethanolic extract and powder of eucalyptus, *Eucalyptus camaldulensis* (Dehnh) for controlling of potato moth, *Phthorimeae operculella* (Zeller). The results revealed that the powder did not have significant effect on egg development period and hatching % of 7 d and 100 %, respectively. The ethanolic extract, 10000 ppm, reduced the egg no. of 27 eggs for female which their pupa were treated. Also, it reduced the egg no. of treated adults of 11 eggs. It was shown that the pupa emergence was reduced by 10000 ppm ethanolic extract for male and female

of 76.92% and 80%, respectively. The conc. of 5000 and 10000 ppm, ethanolic extract gave the highest development of 17 d for each male and female.

PP-67

Thymus syriacus extracts inhibit NF-KB regulation involved in cancer

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NF-κB signaling has become a main topic in the field of immunology and cancer biology. The reach of NF-κB extends to transcriptional regulation beyond the confines of the immune response, acting broadly to influence gene expression events that impact cell survival, differentiation, and proliferation.

Thymus syriacus Boiss was screened in the laboratory of eukaryotic gene expression and signal transduction (LEGEST) in Gent University for immunosuppressive anticancer activities in human breast cancer cell lines MDA-MB231 and MCF7 with strong or weak metastatic properties respectively, as well as murine fibrosarcoma cell lines (L929SA) at the molecular level, targeting NF-κB signaling pathways.

Screening of alcoholic extract and Bidi- extract prepared from *T. syriacus* identified immunosuppressive activities for the alcoholic extract as demonstrated by dose response induction experiments in NF-κB reporter gene assays. Furthermore, no cytotoxicity was exhibited by the alcoholic extract when examined by the MTT cytotoxicity assay at the full tested range (from 0 up to 2 mg/ml). Immunosuppressive properties of this extracts were also further validated by QPCR analysis of endogenous NF-κB target genes involved in inflammation (IL6), metastasis (IL8, uPAR), apoptosis (bcl2, A20) , angiogenesis (VEGF), which are inhibited to various extents by the tested alcoholic extract. Interestingly, although all NF-κB target genes tested were inhibited, transcription in general is not inhibited, as another target gene regulated by Nrf2 family factors is stimulated in response to the *T. syriacus* alcoholic extract. In line with the general inhibition of NF-κB target genes, inhibition of NF-κB/DNA binding by selected extracts could also be demonstrated by EMSA analysis. The latter illustrates that the major activation step of NF-κB activation, i.e. IκB degradation and release of NF-κB to the nucleus is abrogated in presence of the extract.

Intriguingly, in analogy to previous studies on the IKK2 inhibitor WithaferinA, which inhibits IKK2 kinase activity concomitantly with hyper-activation of ERK MAPK, similar results on hyper-activation of ERK MAPK were observed with *T. syriacus*.

PP-68

Antioxidant properties of three *c*-glycosylflavonoids from *Cymbopogon citratus* on human low density lipoprotein oxidation

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Cymbopogon citratus (Lemongrass) is a plant widely used in the traditional medicine of tropical and subtropical countries and it is also commonly used as an aromatic and pleasant-tasting herbal tea.[1] Recently, five *C*-glycosylflavonoids (orientin, isoorientin, isoscoparin, swertiajaponin and isoorientin 2"-*O*-rhamnoside) were isolated from *C. citratus* leaves.[2] The present study reports the inhibitory effect of isoorientin (1), swertiajaponin (2) and isoorientin 2"-*O*-rhamnoside (3) on human LDL oxidation. Isolated LDL was incubated with compounds 1-3 and the kinetics of lipid peroxidation was assessed by conjugated diene and malondialdehyde-thiobarbituric acid reactive substances (MDA-TBARS) formation after addition of copper ions. Significant differences ($P < 0.05$) between the lag time phase of the control and the lag time phase in the presence of the compounds 1 (0.25 μM) and 2 (0.50 μM) were observed. After five hours of incubation all three compounds showed a significant inhibitory effect on MDA-TBARS formation with respect to the control. After six hours of incubation, only compound 1 kept a remarkable antioxidant effect. As oxidative damage to LDL is a key event in the formation of atherosclerotic lesions, the use of this natural antioxidant may be beneficial to prevent or attenuate atherosclerosis.

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PP-69

Seasonal dynamics of the chemical composition and biological properties of licorice (*Glycyrrhiza glabra* l.) Cultivated in czech republic

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Licorice, the dry roots of *Glycyrrhiza glabra* L. (Fabaceae), is considered one of the oldest and most widely used herbal drugs around the world.[1] The chemical composition, antiradical, antioxidant and gastroprotective activities of the methanolic extract of licorice (LE) as affected by four seasonal variations, namely winter, spring, summer and autumn were investigated. The maximum amounts of liquiritin (1) and glycyrrhizin (2) in LE measured by HPLC were observed in winter, while the minimum in autumn. The total content of phenolic (TP), flavonoids (TF) and tannins (TT) were mostly high in both summer and autumn and low in winter. The highest DPPH radical scavenging activity (DSA) of LE was in spring and the lowest one in winter. The superoxide radical scavenging activity (SSA) of LE slightly fluctuated with different seasons. The higher antioxidant activities as measured by the inhibition of β-carotene-linoleate bleaching (IBB), hypochlorous acid scavenging activity (HSA) and inhibition of myeloperoxidase-chlorinating system (IMS)

were observed in autumn, whereas the lower in winter. The LE (25 mg Kg^{-1}) inhibited the ethanol-induced gastric lesions in mice displaying the most favourable gastroprotective activity in winter and spring. The content of TP, TF and TT showed significantly positive correlations ($P < 0.05$) with DSA, IBB, HAS and IMS.

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PP-70
Piper betle: Targeted metabolite analysis and acetylcholinesterase inhibition

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Piper betle L., popularly known as "Paan", is a species widely growing in South East Asia, where its leaves are economically and medicinally important. In order to screen the highest possible number of volatile and semi-volatile compounds, the leaves were subjected to headspace solid-phase microextraction (HS-SPME), hydrodistillation and Soxhlet extraction prior to their analysis by GC/MS.
50 Volatile and semi-volatile compounds were found and distributed by several chemical classes (monoterpenes, sesquiterpenes esters, phenols and derivatives), 23 of them described for the first time. The different techniques lead to distinct compounds extraction, with HS-SPME extracting highest amounts and providing the most complete profile. Within this procedure, best results were obtained using Divinylbenzene/ Polydimethylsiloxane (DVB/PDMS) fibre. Considering the use of the species as masticator, an aqueous extract was also analysed, in which only seven compounds were characterize, being eugenol the main one.
The organic acids composition of this extract was determined by HPLC/UV, oxalic, aconitic, citric, pyruvic, malic, shikimic, acetic and fumaric acids are reported for the first time in this species. The aqueous extract also displayed acetylcholinesterase inhibitory capacity, in a concentration-dependent way.

Acknowledgements
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PP-71
Introduced aspects of pharmaceutical, food and phytoremediation efficiency of purslane (*Portulaca oleracea)*

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Some aspects of plant purslane as a weed has been already studied, but its role as a medicinal plant, the nutritional aspects of humans and livestock and important source of fatty acids, especially "Omega-3 is forgotten in Iran. Purslane is a halophyte, which in addition to being a C4 plant characteristic due to property assets antioxidant compounds. It might be closely related with the increased capacity of antioxidative system to scavenge reactive oxygen species and thus suppressed level of lipid peroxidation and with the accumulation of osmoprotectant proline under salinity conditions. This plant has accumulated property selenium and other heavy or toxic metals like arsenic, cadmium, chromium, iron and zinc in the root and shoot. It can remove salt soil about 500 kg ha. It can reform, recover and improve the saline water irrigation systems. It is well tolerated salinity up to 15.2 dS with equivalent 30-15 percent yield loss, has produced about 4 tons of dry matter per hectare in saline soils. The unique nutritional value of purslane is especially fatty acids (omega -3, linoleic acid (vitamin (A, B1, B2, C, niacin amide, nicotinic acid, alpha- omega-3 fatty acids, alpha-tocopherol, beta-carotene and glutathione, etc.). Purslane extracts included minerals (especially potassium) and other active combinations such as organic acids, glycosides, organic acid, flavonoids, alkaloids, monoterpene glycoside, catecholamines, saponin, polysaccharide compounds that they have an outstanding human and animal nutrition and treatment of diseases. The property treatment can be with delay muscle inflammation, accumulation of ammonia and plasma concentration, decreased bleeding, urea, digestive system(due to high levels of potassium can cause laxative and being proof (stomach skin, cancer, heart disease, treatment of indigestion, treatment bite insects, treatment internal parasites, anti-fungal activity, reducing heart disease- cardiovascular, diabetes, arthritis, warts, Alzheimer's disease, protect against cardiovascular disease, emotional disorders and migraine. It also plants a useful role in addiction and the harmful effects of nicotine are reduced.

PP-72
Assessment of antioxidant activity of plant extracts from *Melastoma malabathricum* l.

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Plant antioxidants are composed of a broad variety of different substances like ascorbic acid and tocopherols, polyphenolic compounds, or terpenoids. *Melastoma alabathricum* is a source of secondary metabolites for examples, flavonoids and flavonoid glycosides, namely quercetin, Kaemferol, naringenin, avicularin, quercitrin, kaempferol-3-O- (2",6"-di-O-p-trans-coumaroyl) and hyperin, phenolics, triterpenes, tannins, saponins, and steroids. Present data on the antioxidant activities of the extracts of *M. malabathricum* to identify as its main properties as natural products to secure the world's food supply and human health for future generation. DPPH radical-scavenging, using ESR (electron spin resonance), was carried out according to the method described by Susanti et al. in 2007. A stock of ascorbic acid (as positive control) in methanol was prepared at concentration of 400 µg/ml. Reaction mixture containing selected extracts (20 mg/ml)

and methanol were prepared. After a 30 min incubation period at room temperature, the absorbance was read against a blank at 520 nm. Inhibition of free radical DPPH was calculated in percent. The Methanol extracts of leaves and roots were stronger free radical-scavengers at DPPH concentration of 8 $mg.mL^{-1}$ with inhibition of 87.11% and 85.17% than were the HE and DE. But they were less than ascorbic acid (94.28 %). ME(s) were found to be active as radical-scavengers with IC_{50} values of were 141.88 µg/ml and 154 µg/ml for leaves and root respectively. The results may confirm the popular usage of this plant as an antioxidant in foods and medicine.

PP-73

Gastric ulcer healing potential by three malaysian medicinal plant mixtures

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To evaluate ulcer healing activity of ethanol extract of three Malaysian Medicial Plant mixtures against indomethacin-induced gastric ulceration. Group 1 rats serving normal control received only vehicle orally. Ulceration was induced with oral administration of indomethacin in group 2-6 rats. Group 2 rats serving ulcerated control received only indomethacin, and were sacrificed after 4 hours. Group 3 rats serving also ulcerated control but received only vehicle once a day starting from 4 hours after indomethacin administration for seven days. Groups 4 and 5 received plant mixture low and high dose respectively, while group 6 rats received omeprazole once daily by oral intubation starting from 4 hours after indomethacin administration. After seven days, all rats were sacrificed. Grossly, plant mixtures-treatment or omeprazole-treatment significantly accelerated rate of ulcer healing compared to ulcer control vehicle-treatment. Histology, vehicle-treatment exhibit gastric mucosa lesions, edema and leucocytes infiltration of submucosa compared to plant mixture-treatment or omeprazole-treatment which exhibited marked gastric healing. Conclusions, present finding suggests that plant mixtures-treatment promotes acceleration of gastric ulcer healing grossly and histologically.

PP-74

Relation between antioxidant properties and flavonoid content of *Zhumeria majdae* subfractions

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Zhumeria majdae Rech.f. & Wendelbo is a rare species of Labiatae family which only distributed in south of Iran (near Persian Gulf). In this research, the antioxidant properties of *Zhumeria majdae* (Z.M) subfractions were investigated.

Zhumeria majdae aerial parts were extracted with n-Hexane and methanol (MeOH), respectively. Defatted MeOH extract of Z.M was dissolved in MeOH and fractionated with chloroform ($CHCl_3$), the residue was dissolved in water and extracted by ethyl acetate. Then ethyl acetate fraction was subjected to further fractionation by using sephadex LH 20. Five subfractions (1-5) were collected based on TLC detection. For evaluating of antioxidant properties of these subfractions we determined DPPH radical scavenging, reducing power and flavonoids content. In reducing power assay subfraction 2 possesses the highest reducing properties. In DPPH radical scavenging which was showed by IC_{50} (the concentrations of extract which scavenge 50% free radicals) subfraction 2 possesses highest activity. In other words, the IC_{50} (41.8±0.61) of this subfraction similar to quercetin as antioxidant standard (38.84± 0.86). The highest amount of flavonoids (antioxidant compounds) was also detected in subfraction 2 (364.6±16.3). Anyway, subfraction 2 possesses the highest antioxidant activity.

PP-75

The effect of *Orchis anatolica* on fertiltiy in adult male mice

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This work aimed at the determination of the effect of *Orchid* bulbs on the reproductive system of male albino mice. The ingestion of *Orchid* bulb by mice induced a significant increase in the following parameters: (i) testes and seminal vesicle weights; (ii) number of different testicular germ cell population including interstitial Leydig cells and fibroblasts; and (iii) testicular cell linage dynamics obtained from testes and cauda epidydimides. An important finding was that the ingestion of the *Orchid* diet by male mice increased their fertility. This was indicated by an elevation in the number of impregnated females when allowed to mate with treated mice, an increase in the impregnation sites, and an increase in the number of viable fetuses and the offspring's male/female ratio. A slight significant increase in the testosterone and follicular stimulating hormone titers in the treated mice were found in their blood serum. In contrast, a decrease in the number of degenerating cells was observed. This led us to conclude that *Orchid* bulb treatment might play an important role in improving male reproductive potential and fertility.

PP-77

The effect of Siberian ginseng (*Eleutherococcus senticosus* maxim.) And german chamomile (*Matricaria recutita* l.) On the lay of hybrid hissex braun layers

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Herbal extracts are suitable and perspective sources in the production of healthy food of animal origin. *Eleutherococcus senticosus* MAXIM. and *Matricaria recutita* L. belong to natural antimicrobial substances, they affect against exhaustion and stress, have hypoglycemic, immunomodulating and antiflammatory effects.

26 layers of Hissex braun hybrid were included in 2 model experiments (1. – 8. week). In the first experiment, the layers were

divided into a control group (CG1= 5 pcs) and an experimental group (EG1=5 pcs), which was fed with dry Siberian ginseng extract (eleutheroside B 0.71 %; eleutheroside E 1,14%, extraction agent 30% ethanol) in the concentration of 0.1 %/ kg. In the second model experiment, the layers were divided into a control group (CG2= 8 pcs) and an experimental group (EG2=8 pcs), to which was applied the feedstuff with the additon of chamomile essential oil (bisabololoxide A, bisabololoxide B a bisabolonoxide do 3 %, farnesene 43±2 %, bisabolol 20±1 %, chamazulene 4.6±0.2 %) in the concentration of 0.1 %/ kg. The layers were kept in three-storey cage battery and fed with feedstuff HYD – 10 from 1. to 3. week of experiment, and HYD – 06 from 4. until 8. week. The food and water were available *ad libitum*. During eight weeks of experiment, the *overall health condition and daily lay of eggs were monitored. Adding of dry extracts of Siberian ginseng and German chamomile positively influenced the lay of eggs. Statistically significant changes were observed.* No statistical significance was proved between the control and experimental groups. We assume that this was due to the short duration of the experiment, or low concentration of extract and essential oil in the feedstuff.

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PP-78

Biologically active substances of siberian ginseng (*Eleutherococcus senticosus* maxim.) And their impact on the selected biochemical parameters in the blood serum of laying hens

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Eleuterococus senticosus (*Eleutherococcus senticosus* MAXIM.), also called Siberian Ginseng, belongs to the family *Araliaceae*. The herb has a positive effect on immunity, lipid metabolism, biochemical parameters, it has anti-stress and anti-inflammatory effects. In the model experiment (lasting 8 weeks) we studied the impact of dry extract of *Eleuterococus senticosus* (Eleuterosid B 0.71%; Eleuterosid E 1.14%, the extraction agent 30% ethanol) on triacylglycerol and cholesterol in the blood serum of laying hens Hisex Braun. Laying hens were divided into three groups - control group (CG = 5 pcs), I. experimental group (EGI = 5 pcs) in which the extract of *Eleuterococus senticosus* was administrated at a concentration of 0.1%/kg, II. experimental group (EGII = 5 pcs) in which the extract was added at a concentration of 0.5%/kg. The observed parameters (triacylglycerol and cholesterol) were determined before the administration of the extract (1st measurement), after the 4th week (2nd measurement) and after the 8th week of the administration of dry extract (3rd measurement). Laying hens were kept in battery cage and fed a mixture of HYD - 10 and HYD - 06. Feed and water were provided *ad libitum*. During the experiment the health status of laying hens was observed. Providing statistical evaluation we found the significant changes (P <0.05) between the control group and I. experimental group, between I. and II. experimental groups in the 2nd measurement and the control group and II. experimental groups in the 3rd measurement.

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PP-79

Dietary revolution and herbal management: a road map to the cure of diabetes

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Diabetes is a dietary disease of the pancreas. It is not contagious. Its symptoms include high blood sugar, excessive urination, thirst and lethargy among others. At present, over one million Nigerians suffer from diabetes. The total figure is expected to increase with the rate at which people adopt modern life style. This trend is not peculiar to Nigeria only. It is a universal and requires a sincere and fundamental management approach. In 2007, this research was carried out in Lagos state, south west Nigeria using some plant extracts in combination with blood group diets. A total of 100 diabetics with blood sugar ranging from 220 – 340mg/100ml were placed on this treatment between February 1st and October 31st, 2007 (9 months) with monthly checks.
At the end of this experiment, 96 patients had progressive reduction of blood sugar level. Subsequent tests revealed significant improvements within normal range amongst the subjects. The extracts contain active phytochemicals.

PP-80

The effect of *Tribulus terrestris* on thoracic aorta contractile response in diabetic rats

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Considering the higher incidence of cardiovascular disorders in diabetes mellitus and some evidence on antioxidant and antidiabetic potential of *Tribulus terrestris* (TT), the beneficial effect of TT feeding on contractile reactivity of isolated thoracic aorta in diabetic rats was assessed. Rats were divided into control, TT-treated control, diabetic, glibenclamide-treated, and TT-treated diabetic groups. Treated groups received TT-mixed with standard pelleted food at a weight ratio of 6.25% for 6 weeks. Serum glucose level was measured at weeks 3 and 6. Finally, contractile reactivity of thoracic aortic rings to KCl and phenylephrine (PE) was determined. Serum glucose level at weeks 3 and 6 showed a significant decrease in TT-treated diabetic group (P<0.01 and P<0.005 respectively) relative to diabetics. In addition, TT-treated diabetic group showed a significantly lower contraction to PE (P<0.05) as compared to diabetic group and such significant reduction was also observed for KCl (P<0.05). Meanwhile, there was no significant difference between control and TT-treated control groups regarding their contractile reactivity to KCl and PE. Oral administration of TT for 6 weeks could exert a hypoglycemic effect and also attenuate

the contractile responsiveness of the vascular system and this may prevent the development of hypertension in diabetic rats.

PP-81

Anticancer effect and inducing of apoptosis by *Ornithogalum caspidatum* herb medicine extract on wehi-164 cancer cell line and comparing with taxol

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Fibrosarcoma is one of the soft tissue sarcomas types. They include 5% of neoplasias in adult patients and 10 % of children tumors. Using herbal medicens that has apoptotic induction impact is one of ways in cancer treatments.In this study, for the first time we exmine cytotoxic effect and inducing of apoptosis *Ornithogalum caspidatum* extract (an Iranian plant) have been assayed on cancer cell line WEHI-164 , model of fibrosarcoma and comparing with taxol.

This is a basic study that the cell line WEHI-164 have been under gone different concentrations of *Ornithogalum caspidatum* extract and taxol, in various times of 6 , 12 and 24 hours treatment and after that we examined cell viability and cytotoxic effects by MTT assay. For studying apoptosis, we chose 12 hours and the concentrations before and affter of IC_{50} extract, using ELISA (Cell Death Detection kit) and flow-cytometry (Annexin v) to assay intra and extracellular changes in WEHI-164, that happen during apoptosis .

Ornithogalum caspidatum extract have cytotoxic effects in three mention times. cytotoxic effects of extract increase with time and concentration, when cytotoxicity increasing the cell viability decreasing. In ELISA, the results showed that the extract causeing apoptosis. In flow-cytometry, we found that there are four group of cell including: viable cells, necrotic cells, apoptotic cells and apo-necrosis cells. When the concentration increased the group of apo-necrosis cells and necrotic cells increaseing and in low concentration of extract the viable cells and apoptotic cells increaseing. Taxol has cytotoxic effect and inducing apoptosis in WEHI-164 in lower concentration than *O. caspidatum* extract. These data are first report on potential anticancer activity of *O. caspidatum* extract on fibrosarcoma. (P<0.001)

PP-82

In vitro effect of *Laurus nobilis* l. Leaves and berries ether oil

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Laurel (*Laurus nobilis* L.) is a well-known medicinal plant. In folk medicine, laurel leaves ether oil is used as carminative, excito-aromatic, nervine, as well as in perfume production. The plant contains several classes of secondary plant products. Fruit contains about 30% of fat and up to 1% of ether oil, sugar, starch, basorin, etc. Leaves contain bitter substances and tannins, and ether oil contains mostly cineol and alpha-pinen.

In this study, we investigated the effect of laurel leaves and berries ether oil on production of hydroxil radicals ($OH^{\bullet}$) and lipid peroxidation of liposomes. Beside that, we were examining sinergistic effect of these ether oils and derivative of fulerene ($C_{60}(OOC\text{-}CHOH\text{-}CH_2\text{-}CH_3)_n$).

Laurel leaves and berries ether oils increased both the production of $OH^{\bullet}$ radicals and intensity of lipid peroxidation, but this increase was lower as mass concentration of ether oils increased. Fulerene derivative used alone increased the production of $OH^{\bullet}$ radicals and the intensity of lipid peroxidation (higher percentage than production of $OH^{\bullet}$ radicals). Combination of laurel leaves and berries ether oil and fulerene derivative increased $OH^{\bullet}$ production even more. Intensity of lipid peroxidation remained unchanged in combination of fulerene derivative and laurel ether oils.

PP-83

Comparison between antibacterial activity of three essences from Lamiaceae family and three essences from Asteraceae family

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In this study antibacterial effect of three essential oils from Lamiaceae family (*Trachyspermum copticum, Thymus serpyylum*, *Nepeta bractata)* and three essential oils from Asteraceae family (*Chrysantemum parthenium*, *Achilla eriophora*, *Anthemis cotula*) were carried out. The essences were extracted by steam distillation and theirs antibacterial effects on *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Bacillus cereus* were studied.

The method that used for growth inhibition concentration was Microdillution broth test. The results demonstrated that all of the essential oils had bactericidal activity, between them *Trachyspermum copticum* had a extreme antibacterial effect and *Anthemis cotula*, *Thymus serpyllum* demonstrated high antibacterial effect but *Nepeta bracteata*, *Chrysantemum parthenium*, *Achilla eriophora* demonstrated low antibacterial effect on gram positive and gram negative bacteria.

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PP-84

Antioxidant activity of *Salvia tchihatcheffii* (Fisch. & Mey.) Boiss. leaf extracts

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Salvia tchihatcheffii (Fisch. & Mey.) Boiss is an endemic plant of Turkey. The leaves of *Salvia* L. (Lamiaceae) species have a reputed use in traditional medicine and they are known as "adaçayı" in the regions where they grow and consumed as a hot drink.[1] In the

present study, the antioxidant activities of the diethyl ether (E), ethanol (A), water (W) and hot water (S) extracts of *S. tchihatcheffii* leaves were investigated. To evaluate the antioxidant activity of the extracts, inhibition of lipid peroxidation, radical scavenging activities, total phenolic contents, flavonoid contents, reducing powers and proline contents were measured and correlation among this parameters were also investigated.

Hot water extract exhibited high antioxidant activity (96.9 %) with FTC method and low IC_{50} value (5.72 ± 0.37) for DPPH radical scavenging activity. S extract was found to contain the highest amount of phenolics (262. 50 ± 4.17 mg GAE/g extract). There were no correlation between antioxidant activity and flavonoid content. Reducing power of extracts (expressed as EC_{50}) increased in the order of AA > S > W > A > E. High correlations were observed between reducing power and antioxidant activities determined by DPPH ($R^2 = 0.99$) and FTC ($R^2 = 0.99$) methods. The hot water extract (S) of *S. tchihatcheffii* showed the highest proline content (6274.22 ± 150.98 µg/g extract) and there was a high correlation between total phenolic and proline contents of A, S and W extracts ($R^2 = 0.99$). The results presented suggest that, leaves of the *S. tchihatcheffii* may be considered as a natural source of antioxidants.

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PP-85

Antioxidant activity of *Petrorhagia lycica* (Davis) ball & heywood leaf extracts

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Petrorhagia lycica (Davis) Ball & Heywood is one of the endemic West Anatolian species of the genus *Petrorhagia* (Ser.) Link (Caryophyllaceae). *P. lycica* is vulnerable plant and grows in Muğla area located in south-west province of Turkey.[1,2] In this work, antioxidative potential of *P. lycica* extracts were determined. Two different extracts were used, methanol and water. All extracts were subjected to three different antioxidant test methods [cupric reducing antioxidant capacity (CUPRAC), DPPH radical scavenging activity and *ferric thiocyanate* (FTC)]. Reducing power of the extracts was also determined. Additonally, total phenolic, anthocyanin and proline contents were investigated.

CUPRAC result were expressed as Trolox equivalent ($TEAC_{CUPRAC}$) and water and methanol extracts of *P. lycica* showed lower (0.054 and 0.152, respectively) CUPRAC values than that of standard antioxidant compound (BHT, 7.59). DPPH radical scavenging activity was expressed as IC_{50} values and lower IC_{50} values means higher DPPH radical scavenging activity. Both methanol and water extracts showed high DPPH radical scavenging activity (22.54 and 14.38, respectively) while IC_{50} values of BHT and ascorbic acid were found to be 180.9 and 6.99, respectively. On the other hand, with FTC method, antioxidant activity of methanol extract (% 84.69 inhibition) was found to be as high as that of BHT (% 97.35 inhibition). Reducing powers of water and methanol extracts (expressed as % ascorbic acid) were found to be % 7.45 and 8.29, respectively. Phenolic contents of methanolic extract were found to be 48.19 mg/g, while phenolic content of water extract was 56.53 mg/g. However, anthocyanin content of the extracts was found to be very low (0.82 mg/g and 0.94 mg/g, respectively). Proline contents were 2.72 mg/g for water extract and 2.16 mg/g for methanol extract.

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PP-86

Antioxidant and hepatoprotective *Cynara cardunculus* growing wild in algeria against paracetamol induced liver injury in rats

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The artichoke (*Cynara cardunculus*) represents an important component of the Mediterranean diet, and is a riche source of bioactive phenolic compound. Additionally, artichokes leaves extract have long been used in folk medicine, particularly for liver complaints.

The present research was aimed to evaluate the potential antioxidant and hepatoprotective activity of wild *C. cardunculus* growth in east of Algeria using *in vitro* and *in vivo* models to validate the use of the plant in folk medicine. *In vitro* screening of antioxidant activities of the butanolic extract of *Cynara cardunculus* was monitored by a serial of tests. The extract exhibited strong antioxidant activity in the DPPH essay (IC_{50}= 29.32±1.29 µg/ml), reducing power and scavenging of H_2O_2.

In vivo, the butanolic extract of *C. cardunculus* was evaluated for hepatoprotective activity in rats with liver damage induced by paracetamol (750 mg/kg). The extract at a dose of 300 mg/kg exhibited significant protective effect by lowering the serum levels of aspartate aminotransferase, alanine animotransferase, alkaline phosphatase and malondialdehyde equivalents, as an index of lipid peroxydation of the liver. These biochemical observations were supplemented by the histopathological examination. The activity of extract was also comparable to that of N-acetylcystein, a known hepatoprotective.

PP-87

Peganum harmala and experimental toxoplasmosis in mice

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Toxoplasma gondii is one the most important apicomplexan parasite of human and other warm-blooded animals. We have studied the effect of ethanol and watery extracts of *Peganum harmala* seeds on tachyzoite of *Toxoplasma gondii* in female BALB/c mice. A total of 120 BALB/c mice (control& experiment) were included, and 10000 tachyzoite organisms of the RH strain *Toxoplasma gondii* were given interaperitonaly to each mouse.

Ethanol and watery extracts of *Peganum harmala* seeds was administered in 10 groups. All of the experimental mice were given plant extracts intraperitoneally with 50, 100, 300, 500, 1000 μg/kg single dose 3 hours after infection. 100% of mice were survived with all of used dosage of ethanol and watery extracts of *Peganum harmala* seeds at 7 days after infection but 100% of positive control mice were died (P<0.001). Tachyzoites of toxoplasma in the liver of w500 (100%) group were disappeared (P<0.00I).

In comparison of control group with all experimental groups, tachyzoites of toxoplasma in the spleen (P<0.001) and liver (P<0.001) were significantly different. The results show that ethanol and watery extracts of *Peganum harmala* are effective on tachyzoites of toxoplasma in mice and they were found to be effective in the treatment of murine toxoplasmosis.

PP-88

Antioxidant activities of endemic *Helichrysum chionophilum* boiss and bal.

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Helichrysum Mill. is a well-known medical herb in family *Asteraceae*. Common names include "*everlasting*" and "*golden herb*". The genus *Helichrysum* Mill. consists of 600 species around the world. This genus represented with 20 taxons, most of them are endemic. *Helichrysum chionophilum* Boiss & Bal. is one of the endemic plants. *Helichrysum* species commonly used in traditional medicine as a herbal tea for their anti-inflammatory and anti-allergic properties. Most of them have essential oil. The essential oil is used for headaches. Medicinal benefits of *Helichrysum chionophilum* mainly emaneted the flavonoids and other organic and inorganic components, such as coumarins, phenolic compounds. In this study, dried aerial parts of the plant used for determine the antioxidant activities of *Helichrysum chionophilum* by 2,2-diphenyl-1-picrylhydrazyl. The results show that *Helichrysum chionophilum* has valuable components for free radical scavenging activity.

PP-89

In vitro antioxidant and antiproliferative activities of pomegranate peel extract

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The Pomegranate fruit (*Punica granatum* L., Punicaceae) contains a wide variety of precious phytochemical compounds applicable in the fields of therapeutics and health care. Previous studies have demonstrated the anticarcinogenic activity of pomegranate extracts in some cancer cells. In this study, we investigated antioxidant and antiproliferative activities of the methanol extract obtained from pomegranate fruit peel (PPE) on MCF-7 human breast adenocarcinoma cells. In addition, total phenolic content and antioxidant activity of the methanol extract were measured by the Folin-Ciocalteau assay and DPPH free radical scavenging activity methods, respectively. Total phenolic content of the extract was calculated **331.28** mg/g dry extract in equivalent of gallic acid. For the determination of phenolic acids, HPLC analysis was performed by utilizing on a C_{18} column (at 280 nm). Elagic acid was the major phenolic compound in the PPE and the other phenolic acids detected from extract were gallic, p-hydroxy benzoic, *catechic acid* and chlorogenic acids. Antiproliferative activity of PPE on MCF-7 cells was determined by MTT and neutral red uptake assays. PPE had significant antiproliferative effect on MCF-7 cells. Antiproliferative activity of PPE increased with cytotoxic effects depending on dose and incubation time. As a result, PPE had antioxidant and antiproliferative activities on MCF-7 cells.

PP-90

The neurotoxic effects of aluminium and contribute to a phytotherapy by *curcumin* –experimental study in mice

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The continued occurrence of occupational Aluminum overexposure and Aluminum poisoning in the World remains a serious problem despite awareness of its adverse health effects. The present study is an exploratory analysis of the effects of Aluminum exposure in brain. By identifying affected brain structures, the associated functional deficits can be more efficiently targeted and understood .the contribute to a treatment by the green tea in mice. Mice's were exposed to 1.6g/l chloride Aluminium drinking water for eight weeks and treated with Curcimen solution (200mg/Kg) during one month. The treatment was effective in decreasing Al levels in mice's, and helps Al detoxification.

PP-91

Helichrysum species as a potential sources of broad spectrum antibiotics resistance modulating compounds

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This study was done to evaluate the interactions between crude extracts of *Helichrysum longifolium* and *Helichrysum pedunculatum* in combination with six antibiotics comprising of penicillin G sodium, amoxicillin, chloramphenicol, oxytetracycline, erythromycin and ciprofloxacin using both the time-kill and the checkerboard methods and against a panel of bacterial isolates comprised of referenced, clinical and environmental strains. For *H. longifolium*; the time-kill method revealed the highest bactericidal activity exemplified by a 6.7 Log_{10} reduction in cell density against *Salmonella* sp. when the extract and penicillin G are combined. Synergistic response constituted about 65%, while indifference and antagonism constituted about 28.33% and 6.67% respectively. The checkerboard method also revealed that the extracts improved bactericidal effects of the antibiotics. About 61.67% of all the interactions were synergistic, while indifference interactions constituted about 26.67% and antagonistic interactions was observed in approximately 11.66%. On the other hand for *H. pedunculatum*; in the checkerboard method, synergy of 45.83% were observed

and this is independent of Gram's reaction, with combinations in the aqueous extract yielding largely (18.75%) antagonistic interactions. The time kill assay detected synergy (45.83%) that is also independent of Gram's reaction with a ≥ 3 Log_{10} potentiation of the bactericidal activity of the test antibiotics. These findings suggest that the crude extracts of the leaves of *H. longifolium* and *H. pedunculatum* could be potential sources of broad spectrum antibiotics resistance modifying compounds.

PP-92

Cholinesterase inhibitory and antioxidant potentials and total phenol and flavonoid contents of the leaves of *Ficus carica* var. *domestica*

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The leaves of *Ficus carica* L. var. *domestica* (Moraceae) have been used as folk remedy in Turkey. Investigations on the leaves of this plant indicated that it has wound healing effect, in addition to anti-diabetic, anti-hyperlipidemic, anti-astma, anti-cancer, and effect against constipation. Alzheimer's disease (AD) is known to associate with deficiency in acetylcholine, a neurotransmitter in the brain. The enzyme, which hydrolyzes acetylcholine, is called acetylcholinsterase (AChE) and it has been a target for scientists who perform research on finding new drug candidates as AChE inhibitors against AD. Another cholinesterase-type enzyme called butyrylcholinesterase (BChE) is also known to be associated with AD.

During our screening studies on AChE inhibitory activity of medicinal plant species, the hexane, chloroform, acetone, methanol, butanol, and water extracts of the leaves of *Ficus carica* L. var. *domestica* were also examined for their AChE inhibitory activity. AChE and BChE inhibitory activity of the extracts was determined by Ellman method in ELISA microplate reader. Their antioxidant activities were tested by three *in vitro* methods; 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging test, ferric-reducing antioxidant power (FRAP) assay and Fe^{+2}-ferrozine test system for metal chelating power at 250, 500, 1000 μg ml^{-1}. Total phenol contents of the extracts were determined using Folin-Ciocalteau's reagent, while total flavonoid content of the extracts was calculated by aluminum chloride colorimetric method. The hexane extract displayed a remarkable inhibition against AChE (62.88±0.91 %) and BChE (76.99±2.24 %) at 100 μg ml^{-1}, whereas all of the extracts exerted a very low antioxidant activity.

PP-93

Elegaphenone and 7-*epi*-clusianone, the main cytotoxic constituents of *Hypericum elegans*

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Two cytotoxic constituents, namely elegaphenone and 7-*epi*-clusianone were isolated from areal parts of *Hypericum elegans* Stepan ex Willd. Elegaphenone was identified as (E)-(2-(3,7-dimethylocta-2,6-dienyloxy)-4,6-dihydroxyphenyl)(phenyl) methanone by means of spectral evidence. Both compounds showed prominent cytotoxicity on HD-MY-Z, K-562 and KE-37 tumor cell lines. The IC_{50} values for elegaphenone were 15.9 (HD-MY-Z), 13.9 (K-562) and 16.9 (KE-37) μM while these of 7-*epi*-clusianone were 9.8 (HD-MY-Z), 11.8 (K-562) and 13.6 (KE-37) μM.

PP-94

Methanol extracts of st. John's-wort (*Hypericum perforatum* l.), Horsetail (*Equisetum arvense* l.) And their comparison of antioxidant efficacy

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Reactive oxygen species or free radicals are part of significant vital processes in the human body. Opposite to this, excessive production might be harmful to an organism. After a system disruption, which regulates production as well as disposal of reactive oxygen forms, pathophysiological changes of a cell appear. Antioxidants prevent formation of these compounds and they lower the possibility of formation of a reactive state. Medicinal plants fall into abundant resources of natural antioxidants. Based on the research of their efficacy, infusions of St. John's-Wort and Horsetail were compared in this contribution. Infusions of these plants degrade free radicals very effectively. Values SC_{50} uptake 2, 2 – diphenyl – 1 – picrylhydrazyl (DPPH) of oxidants were set. Results showed that St. John's Wort has a higher antioxidant activity than Horsetail. The infusions may be used not only in pharmaceutical but also in food industry for their many biological effects.

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PP-95

Antioxidant and antityrosinase activities of clove oil

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The biological activity of various essential oils have been evaluated for developing natural antioxidant that may be involved in anti-aging and anti-wrinkle care. Many reports have demonstrated that essential oils from plant extracts contain phenolic or polyphenolic compounds which have potent antioxidant activity. Many studies found eugenol is phenolic compound in clove oil. The aim of this study was to investigate if clove oil has a potent antioxidant and antityrosinase which contain phenolic or polyphenolic compound. The components of clove oil were identified by GC/MS spectrophotometry. Its major component was eugenol which is a phenolic compound. Using 2,2-diphenyl-1-picrylhydrazyl test (DPPH) and thiobarbituric acid assay (TBARs), and antityrosinase activity by mushroom tyrosinase inhibition method to find the bioactivities of clove oil. GC/MS chromatogram demonstrated that the major components present in clove oil were eugenol (99.16%), caryophyllene (0.29%), butylated hydroxytoluene (0.11%). IC_{50} of clove oil for free radical scavenging activity, lipid peroxidation inhibition, and antityrosinase inhibition were 0.001±0.000, 0.122, and

0.011±0.003 µl/ml, respectively. Furthermore clove oil demonstrated that an antioxidant activity was greater than BHT and alpha-tocopherol. Antityrosinase activity was also greater than kojic acid.

We found that clove oil has antioxidant and antityrosinase activity which can be developed in anti-aging cosmetic uses. However, aging occurs from various factors, it is important to further investigate clove oil to support this study.

PP-96

Efficacy of a novel antilithiatic protein from the seeds of *Dolichos biflorus* in rat urolithiatic model

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Urolithiasis is one of the most painful ailments of the urinary tract disorder. Recurrence and persistent side effects of present day treatment for urolithiasis restrict their use, so an alternate, using phytotherapy is being sought. Recently, we have successfully purified a novel antilithiatic protein from the seeds of *Dolichos biflorus* by using *in vitro* oxalate depletion assay. Then, the *in vivo* efficacy of the protein was validated in rat urolithiatic model. The creatinine clearance reduced by 55% in urolithiatic rats given ethylene glycol and NH_4Cl. The urine of the protein treated animals showed very less number of the crystals. The histological analysis reveled that the protein treatment reduced crystal retention in kidney tissues also. Thus, the present investigation suggests the potential of DAP in preventing calcium oxalate deposition and forms the basis for the development of antilithiatic drug interventions against kidney stone formation.

PP-97

Irradiation effects on phenolic content and scavenger ability of some medicinal herbs formulations note II: *Echinaceea purpurea* L. Aerial part

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The effect of medium doses of γ-irradiation (0.3-15.5 kGy) on total phenolic content was investigated for *Echinacea* hidroalcoholic-extract and *Echinacea* dry complex extract and tablets. Screening for antioxidant ability was performed using DPPH method. Total scavenger activity of *Echinacea* fluid extract were increased until 1.5 kGy/min doses and significant decreased after 5 kGy/min doses of γ-irradiation applied.

IR spectra confirm the changes in chemical structure and were correlated with phenolic content variations.

The *Echinacea* complex extract scavenger activity was very stable at the irradiation treatment but some variations were observed for the *Echinacea* complex tablets.

PP-98

The effect of temperature and solvent extraction on the extractibility of some bioactive substances and antioxidant activity of some medicinal plants note II: *Stachys officinalis* L. Aerial part

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The effects of four different solvent systems (acidulated water; water-ethanol, 50-50 % water-ethanol 30-70 %, acidulated 50 % aqueous ethanol) and two extraction techniques (shaking and reflux) on the extractability of phenolic substances (phenolic acids, flavonoids) and antioxidant activity of aerial parts of *Stachys officinalis* L. were investigated by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay . The acidulated water and water-ethanol 30-70 % extracts exhibited strong antioxidant activity respectively the extracts obtained by reflux technique were found to contained higher quantity of phenolics substances. A strong correlation was observed between total polyphenol and flavonoid contents with antioxidant activity. In addition, some of bioactive phenolic and iridoidic constituents which may contribute largely toward antioxidant potential were evidentiated for their antioxidative properties by TLC with DPPH detection reagent.

PP-99

Induction of apoptosis by tanzanian basidiomycete (*Cantharellus miomboensis*) in liver cancer cells (HepG2)

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Cantharellus miomboensis is a new basidiomycetous strain found in miombo woodlands in Tanzania. In this study its ability to induce apoptosis in cultured HepG2 liver cancer cells was investigated. Crude extract was prepared from fruits of *C. miomboensis* and was *in vitro* screened for its cytotoxicity using MTT assay on the panel of human cell lines. The extract was further examined for their pro apoptotic effects using biochemical changes in apoptotic cells, these included externalization of phospholipid phosphatidylserine (PS) using APO *Percentage* dye by flow cytometry and depolarization of mitochondrial membrane potential using TMRE assay. The HepG2 cells were treated with various concentrations (5mg – 1mg/ml) of extract. The C. *miomboensis* was found to induce dose dependent PS externalization and completely depolarized the mitochondrial membrane potential after 6 hours. Furthermore the extract was examined for Reactive Oxygen Species (ROS) production using DCFH-DA staining, no significant ROS generation was found in HepG2 cells. It was concluded that *C. miomboensis* induce apoptosis in HepG2 cells and that the potent of PS externalization and loss of mitochondrial membrane potential in HepG2 cells appear to be independent of ROS production.

PP-100

The effect of temerature and solvent extraction on the extractibility of some bioactive substances and antioxidant activity of some medicinal plants note i: *Ajuga reptans* l. Aerial part

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The effects of four different solvent systems (acidulated water; water-ethanol, 50-50 % water-ethanol 30-70 %, acidulated 50 % aqueous ethanol) and two extraction techniques (shaking and reflux) on the extractibility of phenolics substances (phenolic acids, flavonoids) and antioxidant activity of aerial parts of *Ajuga reptans L.* were investigated by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. The 50 % acidulated aqueous ethanol extracts exhibited strong antioxidant activity respectively the extract obtained by reflux technique was found to contained higher quantity of phenolics substances. No correlation was observed between total polyphenol and flavonoid contents which ranged between 7.6-300 %, mg/g, gallic acid equivalent and 4.4 -131 %, mg/g rutoside equivalent respectively, with antioxidant activity. In addition, some of bioactive phenolic and iridoidic constituents which may contribute largely toward antioxidant potential were evidentiated for their antioxidative properties by TLC with DPPH detection reagent.

PP-101

The effect of solvent extraction on the extractibility of some bioactive substances and antioxidant activity of some medicinal herbs indicated for cardiovascular protection note I: *Cynara scolymus L.* Aerial part

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The effects of four different solvent systems (ethanol and water-ethanol : 30-70%, 50-50%, 70-30%) with reflux extraction technique on the extractability of phenolic substances (phenolic acids, flavonoids) and antioxidant activity of aerial parts of *Cynara scolymus* L. were investigated by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. The water-ethanol 30-70% extract exhibited strong antioxidant activity, but the highest concentration of polyphenolic substances were found in water-ethanol 50-50 %. No direct correlation was observed between total polyphenol and flavonoid contents with antioxidant activity. In addition, some of bioactive phenolic constituents which may contribute largely toward antioxidant potential were evidentiated for their antioxidative properties by TLC with DPPH detection reagent.

PP-102

Investigation of antioxidant properties of *Arbutus unedo* l. Fruit

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Arbutus unedo L.*(A. unedo)* is anevergreen shrub or small tree native to the Mediterranean region and western Europe north to western France and Ireland. Although it is called "strawberry tree", it does not produce strawberries. The tree produces red fruits which last for 12 months. The fruit is edible and in some traditions it is used to make jam or liqueurs. The fruit is rich in vitamin C and consumed as a health food in some regions.

In this work, fruit of *A. unedo* L. were collected from Selçuk (İzmir) province of West Anatolia and used for antioxidant determination. For this, the collected fruit were homogenized in a blender and lyophilized. The dehydrated fruit was powdered using a coffee mill. The powdered fruit was extracted using two solvents (methanol and water) with different polarities. The solvents of the extracts were removed and the residues were subjected to further analysis.

For the antioxidant evaluation of the extracts three methods were used: ferric thiocyanate (FTC) method; total antioxidant activity measurement using cupric ion reducing (CUPRAC) method; measurement of radical scavenging activity using DPPH (DPPH). The reducing power of the extracts was also evaluated. Total phenolic, proline and anthocyanin contents were measured in order to investigate the levels of potential antioxidant molecules.

The results presented in this study suggest that *Arbutus unedo* L.fruit may be evaluated as a very strong radical scavenger and may be a good source of antioxidants if consumed as fresh fruit.

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PP-103

Effect of methanol extracts of *Randia nilotica* plant on carbohydrate metabolism of *Schistosoma mansoni* worms: *In vivo and In vitro* study

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Methanol extract of *R. nilotica* plant and Praziquantel drug when given to mice infected with *Schistosoma mansoni* resulted in 87% and 59% inhibition of worm-burden respectively as compared with the control mice. This finding shows quite clearly that the plant *R. nilotica* in methanol extract form is more effective in killing the mature worms of *S. mansoni* than the drug Praziquantel which is currently used for the treatment of schistosomiasis.

It has been studied earlier that *S. mansoni* worms when incubated in anaerobic condition in medium without oxygen, obtain their energy by converting glucose to lactic acid. These worms are also able to convert their stored glycogen to glucose in their tissue to increase the glucose supply. Hence when the extract of the plant was added to worms incubated in glucose medium *in vitro*, the inhibition of glucose uptake produced, depends on the concentration of the extract. It increased with the increment of the extract concentration. At higher concentration, inhibition reached 85 %.

The effect of the extract on glycogen content and distribution in tissues of *S. mansoni* worms was clear in histochemical studies of worms. The glycogen granules were very scarce in tissues of worms that collected from mice treated with the extract while it were less scarce in tissue of worms collected from mice treated with Praziquantel as it compared with the granules in tissue of worms collected from untreated mice.

It looks that, the mechanism of action of methanol extract of the plant *R. nilotica* is by cutting the energy of *S. mansoni* worms through the inhibition of glucose uptake which results eventually in the killing of the worms.

PP-104

Antioxidant and anti-inflammatory effects of *Silybum marianum a.* Improves steatohepatitis severity among rats

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High level of oxidative stress, proinflammatory cytokine production and apoptosis are well established in progression of non-alcoholic steatohepatitis (NASH). *Silybium marianum*, a medicinal plant, has strong antioxidant activity and anti-inflammatory effects. In that line, we decided to evaluate whether the extract of *S.marianum* (SME) is capable of attenuating the incidence of NASH and in that case which MAPK would be affected.

NASH was induced in rats using a methionine/choline deficient (MCD) diet for 8 weeks. After the confirmation of NASH, the relevant rats were divided into two major groups: MCD group was fed with MCD diet for four more weeks. The MCD+SME group, received MCD diet plus the SME for the same time period. Control group was fed a normal diet for 12 weeks. Finally, the following factors were evaluated in the liver samples: liver histology, malondialdehyde (MDA) content, TNF-α gene expression and the level of caspase–3, JNK/pJNK.

Histopathological evaluation of the liver samples revealed that treatment with the SME has abated the severity of NASH. Also, the extract caused dramatic reduction in the elevated hepatic TNF-α and MDA levels. Moreover, the extract treatments significantly lowered activation of procaspase–3 and phosphorylation of JNK among the same group of rats, meaning that SME has attenuated cellular apoptotic incidence. Consequently, it can be concluded that the beneficial effects of SME are due to its antioxidant and anti-inflammatory activities.

PP-105

Carum copticum: A spice used in arab traditional medicine for gastric ailments

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Spices are known not only for their taste, aroma and flavor, but also for their medicinal properties. The spices have been used since centuries in various systems of medicines including Arab Traditional Medicine. *Carum copticum* Linn. (Apiaceae/Umbelliferae) is locally known as Nakhwa. It is a highly esteemed medicinal spice from earlier times. As a traditional medicine, the seeds of this plant are used for curing diarrhea, amoebiasis, febrile conditions and various stomach disorders. It much valued for its antispasmodic, antiseptic properties and effects against dyspepsia. In Greeco-Arab medicine *C. copticum* is used as an enhancer of body's resistance. The present study was carried out to evaluate gastric antiulcerogenic activity of aqueous suspension of *C. copticum* in indomethacin-, and necrotizing agents-induced gastric ulcer and basal gastric acid secretion using pylorus ligated Shay rats model. The *C. copticum* suspension at doses of 250 and 500 mg/kg of body weight significantly decreased the incidence of ulcers, gastric acid secretion and titratable acidity in rats. Furthermore, the suspension replenished the ethanol-induced depleted gastric wall mucus and non-protein sulfhydryls (NP-SH) contents. The ulcer preventing potential was further confirmed by histological findings.

PP-106

Effects of *Atractylis gummifera* L. On spermatogenesis and male rats reproductive organs

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Atractylis gummifera L. is widely distributed plant in the Mediterranean countries. Although it is used in folk medicine in some countries, it was found that it is a high toxic plant. Its toxicity is mainly due to its constituents atractyloside and carboxyatractyloside. Several studies have focused on the toxicity of this plant extracts in some organs such as the liver and the kidney, but to our knowledge, there was no published work on its effect on male reproductive system. The aim of the present study is to examine the effect of *Atractylis gummifera* L. rhizome extracts on some parameters related to sperm fertility. Adult male rats were gavaged with the rhizome extract (120 mg/kg) and killed 48 hours and 21 days after treatment. Epididymal spermatozoa were evaluated with respect to quantity, motility and morphology. The histology of testis and epididymis was also studied. Sperm count decreased by around 20% in treated animals killed after 48 hours compared with control. Teratology observations have shown a clear modification of sperm morphology, especially the flagella. Testicular and epididymal morphology was also impaired. It is concluded that *Atractylis gummifera* may cause morphological and functional alteration of the male reproductive tract.

PP-107

Antioxidant activities of traditional Turkish black tea

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Black tea is most popular drink in the whole country. Tea generally is an aromatic stimulant containing in addition to polyphenols and caffeine, essential oils, alkaloids and theobromine. Antioxidants are compounds that help prevent free radical damage. Extracts of *C. sinensis* have been implicated to have potent antioxidant properties and have become a popular natural medicine. Among the many sorts of tea, we preferred commonly used in three tea sort as Tiryaki, Rize Turist, and Kamelya. In this report, we investigated these tea sorts of water soluble extracts for their potential antioxidant activity with DPPH scavenging ability and total phenolics. Total phenol content in tea infusions was determined according to the Folin-Ciocalteau colorimetric method, using gallic acid as a standard. The antioxidant activity of the tea infusions was determined in terms of hydrogen donating or radical scavenging ability, using the stable radical DPPH (IC_{50}). Infusions were prepared to two different teapots; the glass and metal teapot. Analyses of at least three samples were carried out in triplicate. Black tea extracts in metal teapot possesses maximum amount of polyphenols (mg gallic acid equivalents/L) each sort of black tea and the highest one (443.636±0.019) was found in Rize-Turist extracted in metal teapot tea infusion. The highest

DPPH scavenging activity (0,449±0,054 g tea/100ml water) was shown by Rize Turist in tea infusion in metal teapot and the lowest one (1.282±0.063 g tea/100ml water) was shown by Tiryaki extracted in glass teapot. Because, a lower IC_{50} value corresponds to a larger scavenging activity

PP-108

Exploring *In vitro* antioxidant and anti-acetylcholinesterase activity of *Marrubium astracanicum* from Turkey and *M. Vulgare* from Algeria

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Marrubium is a genus of flowering plants in Lamiaceae family, native to temperate regions of Europe and Asia. The genus consists of approximately 40 species, 18 of which grow in Turkey. *M. vulgare* L. (white horehound) has a traditional usage as expectorant and cough remedy in Turkish folk medicine. Another member of this genus, *M. astracanicum* Jacq. is an erect, somewhat branched perennial herb growing in north, south and inner Anatolia. On the other hand, inhibition of acetylcholinesterase (AChE) is considered as a promising strategy for the treatment of neurological disorders such as Alzheimer`s disease (AD). In our continuing studies on AChE inhibitory activity of Turkish medicinal plants, we previously screened a number of Lamiceae plants such as *Salvia* sp., *Rosmarinus officinalis*, *Cyclotrichium* sp, etc.. Consequently, in the current study, our goal was to analyze AChE inhibition and antioxidant activity of the acetone extracts of aerial parts of *M. astracanicum* of Turkish origin and *M. vulgare* of Algerian origin. Antioxidant capacity of the plants was screened by assays of 2,2-diphenly-1-picrylhydrazyl (DPPH), metal-chelating activity and ferric reducing antioxidant power (FRAP). The acetone extract was tested for their AChE inhibitory activity at 25, 50, and 100 µg/ml by spectrophotometric method of Ellman using ELISA microplate reader. As a result; at 100 µg/ml, *M. astracanicum* and *M. vulgare* showed 20.47±1.61 % and 76.30±0.18 % of inhibition towards AChE, respectively. Conversely, antioxidant activity of *M. vulgare* was also better than that of *M. astracanicum*.

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Antioxidant screening on plantaginaceae family– II

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As a result of molecular and phylogenetic studies, a number of different genus is transferred from the Schrophulariaceae to Plantaginaceae family (1). Up to date, we performed a lot of phytochemical and biological researches on the genus *Veronica* which is previously in Schrophulariaceae (2,3). These researches turned us to focus on the researches on Plantaginaceae family. In this respect, the genus *Veronica*, *Digitalis* and *Plantago* which are very important for their chemical contents and usage in traditional medicine, are decided to research in the view point of chemical contents and biological activity. In this research, four *Veronica*, two *Plantago* and one *Digitalis* species were tested for their antioxidant activities using 2,2-diphenyl-1-picryl hydrazyl (DPPH), superoxide (SO) and nitric oxide (NO) radicals spectroscopically. Their total phenolic contents were also determined using Folin-Cicolteau reagent. Samples were collected from different places in Turkey. Their methanol extract was suspended in water and partitioned with petroleum ether. The aqueous extracts were tested for their radical scavenging activities in different concentrations comparing with the standard compounds, BHA and ascorbic acid. Our researches on the antioxidant activity of Plantaginaceae family are still continuing.

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PP-110

Antıoxidant properties of some plants growing in incek (Ankara) District-I

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Incek and its environs located in Southwest of Ankara belong to Golbasi Town and is a province rapidly builded. Natural plants located in residential areas are being adversely affected and destroyed because of this construction and destruction. Therefore, the flora of Incek and its surroundings as well as the plants used for various purposes in folk medicine were investigated before extinct[1]. In this study, antioxidant properties of certain plants growing in Incek such as *Consolida thirkeana*, *Glaucium corniculatum*, *G. grandiflorum*, *G. leiocarpum*, *Hypecoum procumbens*, *Malva neglecta*, *Polygonum cognatum*, *Rumex crispus*, *Scrophularia xanthoglossa* and *Verbascum cheiranthifolium* were investigated. These plants have free radical scavenging, anti-inflammatory and antimicrobial activities in literature survey[2-6]. The radical scavenging activities of the methanolic extracts prepared from these plant species versus reactive oxygen species such as hydrogen peroxide as well as DPPH radical were evaluated in non-cellular system. Reference was Green Tea extract[7]. Among plant extracts, *Verbascum cheiranthifolium, Scrophularia xanthoglossa, Rumex crispus* and *Polygonum cognatum* were the most effective ones on reactive oxygen species in non-cellular system. The results of these studies will be given and evaluated.

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PP-111

In vitro biological activities in the lipophilic extracts of different parts of mahaleb cherry (*Prunus mahaleb* l.)

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Mahaleb cherry (*Prunus mahaleb* L.), a wild member of *Rosaceae,* is a significant rootstock for cherry and sour cherry cultivars. Besides horticultural importance, all the parts, specifically the seeds have been used as a spice for Mediterranean cousins for centuries. There is also recorded folkloric usage of the other parts of mahaleb such as flowers, leaves and fruit stalks in traditional medicine. In the present study, methanol and *n*-hexane extracts of different parts of mahaleb cherry such as flower, leaf, branch, fruit, fruit stalk, and seed were screened for their *in vitro* antibacterial, antifungal and antioxidant activity. Antibacterial and antifungal activities were evaluated against both the isolated strains of 5 Gram-negative and 3 Gram-positive bacteria, as well as 4 fungi by microdilution method. All the extracts have shown antibacterial activity against Gram-positive standard bacteria ranging between 16-64 μg/ml concentrations coupled with Gram-negative (8-64 μg/ml) ones, while they demonstrated antifungal activity at 16-64 μg/ml concentrations. All the extracts were found to have a better inhibition against *C. krusei* with MICs value of 64 μg mL^{-1}as compared to control fluconazole (64 μg/ml). Antioxidant activity of the extracts was evaluated using DPPH method. The data revealed that the methanol extracts displayed better antioxidant activity than the *n*-hexane extracts.

PP-112

Jujube, a medicinal fruit

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Jujube (*Zizyphus jujube* Mill.) is one of the numerous species of Zizyphus which is some 8 meters high and its fruit is edible. Jujube is native to semi-tropical regions of the world and grows in North Africa, South Europe, and the Mediterranean Sea region. This plant was cultivated in China some 4000 years ago. China's annual production of jujube is 450 thousand tons. In Iran, jujube is cultivated and produced solely in South Khorasan province. Jujube is cultivated and produced in an area of over 699 hectares and the annual yield is 1866 tons.

Jujube is another garden product which is produced in 93% of the provinces farmlands and constitutes 95% of the country's overall production. The leaves of Jujube tree are small, beautiful, transparent, and corrugated. The flowers are small and greenish. The fruit is oval shape and red, containing one single seed. The jujube tree wood is valuable too. The wood is strong, durable and plain and used for the manufacture of musical instruments. It is also used for artistic and ornamental purposes, ship building and carpentry. This plant tolerates almost all climatic conditions and is grown in soils with various qualities. Jujube is resistant to cold too. Jujube contains about 5% protein, 4% sugar, and abundant amounts of vitamin C and minerals. The extract of jujube skin contains considerable amounts of zizyphic acid.

Jujube fruit is tasty and has medicinal properties. Jujube helps people recover weight loss and strengthens muscles and boosts body strength and immunity system. In Chinese medicine, jujube is used as a substance that activates the liver. Jujube has anti cough properties. It helps people enjoy a sound sleep. The jujube tree skin extract has anti diarrhea properties. Jujube is also helps to the growth of hair, smoothes coarse voice, strengthens memory and heals coughing. Jujube fruit contains many medicinal properties and cures coughing. It is a cure for asthma and respiratory problems. Dried jujube fruits are effective tranquilizers and act as anti cancer and anti respiratory problem agents, they relieve fever and are used as pain killers and Appetizers prevent bleeding and help easy digestion and a lot more. Jujube fruits are used to regulate heart beat, treat exhaustion and depression and act as excessive late night perspiration.

Jujube roots are useful in the treatment of digestive disorders. When converted into powder, the roots of jujube act as wound healers. Jujube is useful in the treatment of kidney disorders and inflammations as well as in the treatment of nervous problems. In China, jujube is extensively used for the treatment of burns.

PP-113

Antioxidant activity and total phenolic content of leaves of *Lawsonia inermis* from Iran

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Henna (*Lawsonia inermis*) is worldwide known as cosmetic agent, anticarciogenic, anti-inflammatory, analgesic and antipyretic.[1,2] The present study is an attempt to evaluate the utilization of Henna leaves extract as a source of natural antioxidants. Different solvents were used to prepare extracts of Henna leaves. Effect of addition of Henna leaves extract on the stability of soybean oil was studied by spectrophotometric method according to the Folin Ciocalteu and calculated as tannic acid equivalent.[3] Antioxidant activity of methanolic and water extract was determined with 2-thiobarbituric acid and peroxide values besides of rancimat method (90, 120, 150 °C). BHA, BHT and TBHQ as synthetic antioxidants were used for comparison with the extracts at various concentrations. BHA and BHT at 200 ppm and methanolic extract at 800 ppm and 1400 ppm had equal TBA (2-thiobarbituric acid) and PV (peroxide) values. Both extracts and synthetic antioxidants at different concentrations were compared with rancimat method.

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PP-114

Effect of two extraction methods on the antioxidant activity of henna (*Lawsonia inermis*) leaves

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Henna (*Lawsonia inermis*) is worldwide known as cosmetic agent, anticarciogenic, anti-inflammatory, analgesic and antipyretic.[1,2] The present study is an attempt to evaluate the utilization of Henna leaves extract as a source of natural antioxidants. Different solvents including methanol, ethanol, acetone, chloroform, hexane and water were used to prepare extracts from Henna leaves. Attempts were also made by two different solvent extraction methods (percolation and ultrasound-assisted methods) with methanol and water. Water extract in comparison with the methanolic one had more yield. Total phenolic compounds in the extracts was determined by spectrophotometric method according to the Folin Ciocalteu and calculated as tannic acid equivalent. Methanolic extract showed higher value of phenolic content.[3] Also sonication improved the total phenolic compounds of the extracts and extraction time.

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PP-115
Antibacterial properties of *Allium subhirsitum*

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The genus *Allium* is one of the major sources of dietary flavonoids, which are a group of polyphenolics, in many countries.[1,2] This genus comprises 700 species of bulbous perennials and biennials that occur in temperate regions of the northern hemisphere [3] and 164 of which are available in Turkish flora; 65 of them being endemic.[4-6] As far as being beneficial to human health, *Allium* plants are already well known.[7] For example, garlic (*A. sativum*), is of particular interest owing to its prophylactic and therapeutic actions.[7] Anecdotal evidence supports the important roles of the members of this genus in the prevention and treatment of pathogenic infections, tumor and cardiovascular diseases.[7] Phytochemical studies of *Allium* species revealed that, mainly flavonoids, spirostanol[8], furostanol type saponins and anthocyanins[9] were isolated from different parts of the plant. Additionally, free radical screening and antibacterial properties of different *Allium* species were investigated.

Allium subhirsitum was collected from Karacasöğüt (Marmaris). The antibacterial efficiency of n-hexane, CH_2Cl_2, MeOH extracts of *A. subhirsitum* were tested according to disc diffusion method[10] by using *Staphylococcus aureus*, *Klebsiella pneumonia*, *Escherichia coli* and *Pseudomonas aeruginosa*. The antioxidant activity of n-hexane, CH_2Cl_2, MeOH extracts from *A. subhirsitum* will be studied with the DPPH radical method.

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PP-116
In vitro antimicrobial activity of *Helichrysum italicum* growing in Marmaris

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There are about 300 Helichrysum species in the world [1]and 16 of them grow in Anatolia[2]. In Turkey, the widespread and polymorphic species (*H. arenarium*, *H. armenium*, *H. graveolens* and *H. plicatum*) can usually be identified by their characteristic types of rootstock, together with the presence or absence of swollen sterile shoots.[2]

Helichrysum spp. is a phenolic-rich plant. Many flavonoids, chalcones , acylphloroglucinols terpenoids and acetophenone glycosides were isolated from methanolic extracts of plant. Moreover, chemical composition, antimicrobial and antioxidant activities of Helichrysum essential oils were well investigated.

H. italicum was collected from Hisarönü (Marmaris). The dried, powdered plant was extracted with n-hexane, CH_2Cl_2 and MeOH respectively with Soxhlet apparatus. All extracts were investigated for their antimicrobial effect against four species of microorganisms; *Staphylococcus aureus*, *Klebsiella pneumonia*, *Escherichia coli* and *Pseudomonas aeruginosa* using the disc diffusion methods[3].

In our further investigations on this plant, the antioxidant activity of n-hexane, CH_2Cl_2, MeOH extracts from *Helichrysum* will be studied with the DPPH radical method and antioxidant-guided fractionation carried out. Our aim is to isolate antioxidant active compounds.

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PP-117
In vitro biological activity of *Liquidambar orientalis mill.* Against pathogen and marine biofilm microorganisms

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Liquidambar orientalis Mill. is an endemic tree species for E. Medit. element, of Boreal-Tertiary origin. Closely related to *L. styraciflua* L. from eastern N. America. It differs from the latter in its leaves being nearly always glagrous beneath (instead of constantly having a thick woolly pad of hairs in the axils of the main veins), and usually lobulate lobes. The Turkish *Liquidambar* forms a smaller, rounded tree than the American species which has a tall, columnar-pyramidal crown. *L. orientalis* is a medicinal plant. The balsam, "liquid storax" (in Turkish "Günlük" or "Sigala") is produced by wounding the bark; 62 tons were exported to Europe and U.S.A, in 1960.[1]

The storax sample obtained from Günnücek (Marmaris) in August, extracted with n-hexane, CH_2Cl_2 and MeOH respectively. The n-hexane, CH_2Cl_2, and MeOH extracts were tested at concentrations of 10.0 %, 1.0 %, 0.2 % and 0.1 % against two different groups of bacteria: Pathogens and seawater bacteria forming biofilm. Biofilms can have negative effects on human activities in many ways, including: energy waste, heat transfer resistance, requirement for excess equipment capacity, decreased life of equipment, quality control problems, and safety problems.[2,3] *Klebsiella pneumonia, E. coli, Salmonella typhimurium, Staphylococcus aureus*, *Pseudomonas aeroginosa, Bacillus cereus, Enterococcus faecalis* and *Candida albicans* were used as pathogen microorganisms whereas, *Pseudoalteromonas marina, P. haloplanktis, Alteromonas alvinella, Alteromonas genoviensis Vibrio splendidus, Exiguobacterium homiense,* and *Vibrio lentus* were used as biofilm forming seawater bacteria. The antimicrobial activity of all extracts was determined by using the agar diffusion method. Concerning the antimicrobial activity of *L. orientalis* Mill. extracts against pathogens, the MeOH extract of storax showed more potent antimicrobial activity than CH_2Cl_2 and n-hexane extracts. Inhibitory activities of *L. orientalis* extracts were high or moderate against biofilm bacteria, while they were found to be low against pathogenic microorganisms tested.

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PP-118

Antibacterial activity of *Myrtus communis* l. Species growing wild in Marmaris

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Myrtus communis L. is a plant traditionally used as an antiseptic and antidisinfectan drug.[1] Concerning the chemical study of plant, several compounds have been isolated from the leaves[2,3], the essential oil[4], and the fruits.[5] The fruit is spherical in shape, dark red to violet in colour and is reported to contain delphinidin-, petunidin-, malvidin-, peonidin- and cyanidin-3-mono- and 3,5-diglucosides[5] , along with glycosides of myricetin and quarcetin. Three *Myrtus* fruit samples collected from different regions of Marmaris, were dried, grinded and extracted with n-hexane, CH_2Cl_2 and MeOH respectively. The n-hexane, CH_2Cl_2, and MeOH extracts prepared from the fruits of *M. communis* were screened *in vitro* for their antimicrobial activities using disc diffusion method.[6] Tested microorganisms are_*Staphylococcus aureus*, *Klebsiella pneumonia*, *Escherichia coli* and *Pseudomonas aeruginosa*. All extracts of the plant material are also worthwhile to investigate further for its antioxidant activities.

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PP-119

Antimicrobial activities of *Pseudomonas* soil isolates against medicinal plant pathogenic fungi

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Limiting factors for production of medical plants are the diseases caused by phytopathogenic fungus. We estimated antifungal activity of *Pseudomonas* isolates, which products are environmentally safe and able to reduce use of toxic fungicides. We selected 12 of 37 Pseudomonas isolates from 4 type of soil on the basis of their genodiversity obtained using $(GTG)_5$ primer in BOX-PCR analysis. The growth of sixteen phytopatogenic fungi: *Alternaria alternata, Aspergillus niger, A. flavus, Fusarium oxysporum, F. verticillioides, F. proliferatum, F. semitectum, F. sporotrichioides, F. equiseti, F. solani, Sclerotinia sclerotiorum, Verticillium spp, Dreschlera tetramera, Curvularia lunata, Diaporte eres complex* and *Myrothecium verrucaria* were tested in combination with selected bacteria using agar-disc diffusion method. Fungal inhibition were measured and daily observed. The 4 Pseudomonas isolates with clear antifungal activity were selected, but two of them were phytopatogenic. Isolate PS2 exhibited the highest antifungal activity which strongly inhibited the growth of 10 out of 16 investigated plant pathogenic fungi. Amplification of 16S rDNA region was carried out by fD1/rD1 primers and sequence of 4 isolates was obtained using Macrogen Inc. (Korea) service. Two selected *Pseudomonas sp.* and its components proved themselves as suitable candidates for biological control of some pathogenic plant fungi.

PP-120

Antioxidant activity and phenolic content of *Hypnea flageliformis* alga from Persian Gulf

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Antioxidant compounds play an important role against different diseases. For safe and effective antioxidants from natural resources, marine organisms are a new source. In recent years,

algae have attracted great attention of researchers. They are also rich in proteins, minerals and polysaccharides. As a result they can be a source of healthy food and may have new antioxidant compounds. However, almost few studies have been done about antioxidant activities of algae, especially those are from Persian Gulf. In this study, antioxidant activity and phenolic content of *Hypnea flageliformis* were assessed. Alga was collected from Qushm Island. Dried alga was extracted by ethanol (90%). For determination antioxidant activity, radical scavenging activity and reducing power were carried out. In radical scavenging activity, the IC_{50} (the concentration of the alga required to scavenge 50% of the DPPH free radicals) was 1.7 mg/ml. The IC_{50} of gallic acid (0.0027 mg/ml) as powerful antioxidant standard was less than alga extract ($P<0.0001$). In reducing power, at concentration of 7 mg/ml the absorbance of alga extract was (0.5). In comparison, this criterion for gallic acid was at 0.0019 mg/ml ($P<0.0001$). The phenolic content was 1.1 mg/g of extract. Totally *Hypnea flageliformis* alga, possessed moderate antioxidant activity.

PP-121

Effect of *Chrysanthemum fuscatum* on the altered levels of redox components induced by antitubercular drugs in rat liver

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In order to study the hepatoprotective effect of Chrysanthemum fuscatum Desf. during antitubercular therapy, a comparative antioxidant effect of n-butanol soluble part of the aqueous-methanol extract of the aerial parts of this plant and silymarin on the isoniazid and rifampicin induced oxidative stress in rats was examined in both liver homogenates and mitochondrial fractions. A model of hepatotoxicity was produced by giving 50 mglKg per day each of isoniazid and rifampicin in two weeks. The pretreatment of rats with the butanol extract of C. fuscatum or silymarin (200 mglKg, 25 mglKg per day respectively) exhibited a significant prevention by lowering the lipid peroxidation and by enhancing the cellular antioxidant defence. The effects of both drugs were comparable in most parameters. A marked response, expressed as relative effect, of glutathione system was observed in C. fuscatum extract rat liver as it was evident from the significant increase of glutathione level (78-80 %) and glutathione peroxidase activity (62-80%) in both liver homogenates and mitochondrial fractions. C. fuscatum extract was also found to be more potent than silymarin in the preservation of mitochondrial ubiquinol-10 (80%). The present study may help in explaining at least in part the mechanism of action of C. fuscatum extract that could be attributed to its ability to induce the redox components: glutathione antioxidant system and mitochondrial ubiquinol-10.

PP-122

Citrus peel: A promising antioxidant by-product with anti-proliferative potential

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Citrus peel is a major by- product from citrus juice production, known to be rich in polyphenols, potent antioxidant compounds. This study comprises the analysis of the epicarp of three *Citrus* species, from *Geraniales* order, *Rutaceae* family: *Citrus limonum* L. (lemon), *Citrus aurantium* L. (orange), *Citrus paradisici* (grapefruit). In order to establish another potential use of citrus peel we performed preliminary *in vivo* tests, targeting the possible implication of the three vegetal products in the cellular proliferative process, with probable antitumor and antiangiogenic effects.

For the *in vivo* determinations, 6% (g dry vegetal product/100 ml H_2O) aqueous solutions. The evaluation was done by performing the phytobiological comparative test on germinating seeds of *Lepidium sativum* for several dilutions of the extractive solutions. At concentrations as 1% and 0.5% all the samples determined an inhibition rate between 90 and 99%, with no detectable differences; for the less concentrated extracts (0.25% and 0.125%) differences in the intensity of inhibition effect could be observed: lemon > orange > grapefruit. Another *in vivo* determination was the chicken chorioallantoic membrane assay. The results seem promising for a future use of the high quantities of citrus peel by-products resulting each year for the preparation of selective extracts with antiproliferative effects.

Acknowledgements

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PP-123

Vegetable oils with skin application

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Vegetable oils are a class of natural products very frequently used in phytocosmetology including the antiaging therapy. This is a preliminary study of five vegetable oils commonly used in the cosmetic field: hazelnut oil, argan oil, olive oil, grape seed oil and sesame oil. The concentration of melanin and sebum in the dermis (as parameters of the skin level antiaging process) and the erythema were measured with the device Mexameter MX18 and Sebumeter MS 815.

Argan oil and sesame induce a slight reduction in the concentration of melanin. Argan oil, olive and grape slightly reduce the erythema; the peanuts and sesame maintain physiological state of skin. The application of hazelnut and olive oils induce an increase in concentration in sebum, as well as argan and grape seed oils, but to a lesser extent, while sesame oil induced the lowest level of sebum in the dermis.

Studies on human subjects after a period of 28 days of application provide important information about the recommendations of vegetable oils on the skin for a medium term. In order to choose the most appropriate oil for a certain type of skin or dermatologic problem, parameters like melanin concentration, sebum or

erythema must be taken into consideration.

PP-124

In vitro efficacy of *Cymbopogon citratus* essential oil and its major constituents against *Candida albicans*

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The essential oil from *Cymbopogon citratus* has been analyzed by gas chromatography-mass spectrometry. It was found that the major constituents were citral (75.7%) beta-myrcene (9.5%), geraniol (4.4%) and geranyl acetate (2.2%). The effects of *C. citratus* essential oil and its major constituents against *Candida albicans* were evaluated in both planktonic and biofilms form. The results from broth microdilution method revealed that among the *C. citratus* oil and its 4 major constituents, geraniol exhibited the lowest minimum inhibitory (MIC) and minimum fungicidal concentration (MFC). The MIC and MFC of geraniol against *C. albicans* were 0.25 and 0.5 µl/ml, respectively. Employing a formazan salt reduction assay for biofilm study, the results showed that among the tested agents, geraniol also exhibited the lowest MIC both in preventing of biofilm formation and against preformed *Candida* biofilm. Overall, the data demonstrated that among the *C. citratus* oil and its 4 major constituents, geraniol exhibited the most inhibitory effects against *C. albicans* in both planktonic and biofilms form. Further investigation of its mechanism of action on *Candida* biofilms would be necessary.

PP-125

In vitro and *in vivo* antiplasmodial activity of active constituent from the stem bark of *Garcinia parvifolia* (Miq) Miq

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We present an evaluation of the antiplasmodial activity of active constituent from the stem bark of *G. parvifolia* (Miq) Miq. A bioassay-guided fraction of the most active n-hexane extract resulted in the isolation of two triterpene as α-amirin and stigmasterol and of xanthone derivate as α-mangostin. *In vitro* α-amirin and stigmasterol and of xanthone derivate as α-mangostin exhibit an antiplasmodial activity against a chloroquine resistant (FCR-3) *Plasmodium falciparum* strain with IC50 values of (236,2 ±1,6) µg/mL to incubation time 24 h and (175,6 ±1,8) µg/mL to incubation time 72 h, (193,4 ±1,4) µg/mL to incubation time 24 h and (88,7 ±1,6) µg/mL to incubation time 72 h, (11,5 ±1,6) µg/mL to incubation time 24 h and (5,8 ±1,5) µg/mL to incubation time 72 h and a chloroquine sensitive (D10)) *Plasmodium falciparum* strain with IC50 values of (186,3 ±1,7) µg/mL to incubation time 24 h and (173,7 ±1,7) µg/mL to incubation time 72 h, (127,6 ±1,6) µg/mL to incubation time 24 h and (116,7±1,8) µg/mL to incubation time 72 h, (9,9 ±1,5) µg/mL to incubation time 24 h and (6,9 ±1,7) µg/mL to incubation time 72 h, respectively. In vivo, at a daily dose of 10 mg/kg body weight, they produced 15,92%, 46,80% and 55,4% reduction of parasitemia in mice infected with *Plasmodium berghei* , respectively.

PP-126

Gastroprotective effect of a popular spice assafoetida "*Ferula asafoetida* l." Used in Arab traditional medicine

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Assafoetida "*Ferula asafoetida* L." (family: Apiaceae) (known in Arabic: Hilteet; Turkish: Şeytantersi) is one of the spices widely used as pungent flavoring agent and in traditional medicine of various countries including South East Asia and Middle East. The oleo-gum resin of asafoetida is an ancient medicinal spice used to treat gastric disorders. The present investigation was undertaken to validate the claims of Arabian traditional medicine practitioners on the gastric antiulcer properties on experimentally-induced gastric secretion and ulceration in rats. Gastric acid secretion studies were undertaken using pylorus-ligated Shay rats. In another experiment, gastric lesions were induced by noxious chemicals including ethanol, strong alkalis and indomethacin, the assafoetida suspension was administered orally. The levels of gastric wall mucus (GWM) and non-protein sulfhydryls (NP-SH) were measured in the glandular stomach of rats following the ethanol administration. The gastric tissue was also examined histologically. The suspension was used in two doses (250 and 500 mg/kg body weight) in all experiments. In pylorus-ligated Shay rats, aqueous suspension of assafoetida significantly and dose-dependently reduced the basal gastric acid secretion, titratable acidity and ruminal ulceration. Asafoetida suspension significantly attenuated gastric ulceration induced by necrotizing agents and indomethacin. The pharmacological and biochemical findings were further supported by histological assessment.

PP-127

Quality control of an antipsoriatic herbal oil formulation

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Psoriasis is a polygenic, chronic relapsing inflammatory disease creating the typical skin lesions (reddish-scaly plaques). The current treatment recommends topical application of drugs, phototherapy and systemic therapies. Continuous administration of these drugs leads to potential life threatening side effects, like nephrotoxicity, bone-marrow depression and hepatotoxicity. Hence, it becomes imperative to search for alternatives preferably from the botanicals and dietary supplements. In the present investigation, a topical oil formulation of herbal origin containing oil soluble contents of *Wrightia tinctoria*, which has been found in the treatment of psoriasis by different mechanism, was investigated. The quality control of oil formulation was done for determination of fatty acid composition, total phenolic and flavonoidal constituents. Additionally aflatoxin, heavy metals, and pesticide residues were also determined. Results indicated that antipsoriatic oil formulation was composed of 16 fatty acids which represented 92.42% of total fatty acid composition. The oil

consisted of seven saturated fatty (68.37%) and nine unsaturated fatty acids (24.05%). Total phenolic and flavonoidal content was found to be 486.554 mg/L and 404.490 mg/L respectively. The aflatoxins acids (B1, G1, B2 and G2), heavy metals (lead, arsenic, mercury and cadmium) and pesticides residues were either absent or present in minute quantity below the permissible limit.

PP-128

Antioxidant activity of *Trifolium* species

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Trifolium genus (Leguminosae) is represented by 103 species in Turkey (Zohary & Davis, 1970), which 67 taxa of them have been growing in Trakya, European part of Turkey. This shows that Trakya is the centre of diversity of *Trifolium* species (Zohary & Heler, 1984). The medicinal and economic importances of the *Trifolium* species have been reported in the literature up to now. For example, *T. repens* Lin., *T. arvense* Lin. and *T. pratense* Lin. have medicinal value in Turkish folk medicine, used as expectorant, analgesic, antiseptic and tonic properties (Baytop, 1984). Some of the *Trifolium* species are also used as feeding material for sheep and cattle in the Mediterranean (De Rijke et al., 2001; Oleszek & Stochmal, 2002).

The antioxidant activity of the *T. nigrescens* subsp. *petrisavi*, and *T. echinatum* collected from Corlu-Tekirdag province of Turkey were studied. For this purpose, each *Trifolium* species was extracted with methanol three times. After the solvent was evaporated, the residue was suspended in water and extracted with *n*-hexane, CH_2Cl_2, EtOAc and *n*-BuOH, successively. Eight extract from two *Trifolium* species were tested for their radical scavenging activity by DPPH assay and for their lipid peroxidation inhibition activity by β-carotone-linoleic acid assay. In addition, total phenolic and total flavanoid contents of the extracts were determined as pyrocatechol and quercetin equivalents, respectively (Sabudak et al., 2009).

In the β-carothene-linoleic acid assay, total antioxidant activity of the ethyl acetate and *n*-butanol extracts of *T. echinatum* and the ethyl acetate extract of *T. petrisavi* indicated better activity than the others with IC_{50} values of 15.00, 18.35, and 31.89 µg/mL, respectively. Similarly, in the DPPH assay IC_{50} values were found to be 10.32, 16.44, and 12.38 µg/mL, respectively. Both EtOAc extracts of the species (159.22±0.37, and 158.18±1.84 µg/mL pyrocatechol equivalents, respectively) had a higher phenolic content than others, while the most flavonoid rich extract was found to be *n*-BuOH extract of *T. echinatum* (290,63±1,83 µg/mL quercetin equivalents). A correlation was found between the antioxidant assays. This study is important in that the antioxidant activity of CH_2Cl_2, EtOAc and *n*-BuOH extracts of the both *Trifolium* species was investigated for the first time in this study.

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PP-129

Neuroprotective effect of silymarin in 6-hydroxydopamine hemi-parkinsonian rat

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Parkinson's disease (PD) is a neuropathological and debilitating disorder involving the degeneration of dopaminergic neurons. Silymarin (SM) as a natural product from the plant *Silybum marianum* is reported to prevent neuronal degeneration caused by increased oxidative burden. This study examined whether SM could attenuate behavioral and structural abnormalities in an early model of PD and to evaluate involvement of estrogen receptors and oxidative stress. Unilateral intrastriatal 6-hydroxydopamine-lesioned rats were pretreated i.p. with a single high dose of SM (200 mg/kg) 1 hour before neurotoxin injection. Fulvestrant (ICV) was used to evaluate the involvement of estrogen receptors. Net apomorphine-induced rotations and number of Nissl-stained neurons of substantia nigra pars compacta (SNC) were counted after two weeks. SM administration attenuated the rotational behavior in lesioned rats and protected the neurons of SNC against 6-OHDA toxicity and fulvestrant partially attenuated this response. In addition, pretreatment with SM significantly decreased the 6-OHDA-induced thiobarbituric acid reactive substances (TBARS) formation. Furthermore, the increase of nitrite levels induced by 6-OHDA and the decrease of antioxidant defense enzyme superoxide dismutase (SOD) was non-significantly prevented by SM. In summary, SM administration has a neuroprotective effect against 6-OHDA toxicity, partly through attenuating oxidative stress and via an estrogenic pathway and this could provide benefits, along with other therapies, in neurodegenerative disorders like PD.

PP-130

Anticholinesterase and antioxidant appraisal of some *Salvia* species from Euro-Sibirian and Mediterranean phytogeographic regions

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The genus *Salvia* (Lamiaceae) is represented by over 900 species worldwide. Anatolia is a major center for *Salvia* in Asia with 95 species, 53 % of which are endemic to Turkey. *Salvia* species, having a wide range of biological activities, have been recorded to be used against memory loss in European folk medicine. We have herein examined *in vitro* anticholinesterase and antioxidant activities of some *Salvia* species which belong to the Euro-Sibirian and Mediterranean phytogeographic regions. Extracts from *S. glutinosa* L., *S. tobeyi* Hedge, S. *argentea* L., *S. pinnata* L., S. *quezelii* Hedge & Afzal-Rafii, and S. *viscosa* Jacq. growing in

Turkey were prepared with dichloromethane, ethyl acetate and ethanol, successively. AChE and BChE inhibitory potentials of the extracts were determined by Ellman method in ELISA microplate reader at 25, 50, and 100 μg ml^{-1}. Their antioxidant activities were assessed by DPPH radical scavenging activity, iron-chelating capacity and ferric-reducing antioxidant power (FRAP). Total phenol contents of the extracts were determined using Folin-Ciocalteau's reagent. Total flavonoid content of the extracts was calculated by aluminum chloride colorimetric method. According to the results, only dichloromethane extract obtained from aerial parts of *S. argentea* showed a weak anti-AChE effect (22.79 %). The ethanol extracts exerted the highest scavenging activity against DPPH radical. *S. glutinosa* had significant activity with 89.57 % scavenging effect and 1.922 absorbance at 700 nm in FRAP test. The dichloromethane extract of *S. glutinosa* had a noteworthy iron-chelating capacity at 1000 μg/ml having 46.27 %, while the ethyl acetate extract of *S. tobeyi* had 47.17 % at the same concentration. Total phenol content of the *S. glutinosa* ethanol extract was 231.20 ± 2.90 mg/g extract as gallic acid equivalent and total flavonoid content of *S. pinnata* ethyl acetate extract was calculated as 162.55 ± 0.93 mg/g extract as rutin equivalent.

PP-131

Antioxidant activity and total phenolic content of the extracts of some *Achillea* species

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The genus *Achillea* L. (Asteraceae), distributed in Europe, Asia and North Africa, is represented by 45 species in Turkey, 22 of which are endemic. *Achillea* species are used in our country due to mainly their carminative, diuretic, emmenagog and wound healing effects.

The purpose of this study is to determine total phenolic contents and the antioxidant capacities of methanol extracts of *A. biebersteinii* Afan., *A. coarctata* Poir., *A. kotschyi* Boiss. subsp. *kotschyi*, *A. lycaonica* Boiss. & Heldr., *A. setaceae* Waldst. & Kit and *A. wilhelmsii* C. Koch. which are growing in Turkey. Total phenolic content and antioxidant activity of the extracts were measured by the Folin–Ciocalteau and 2,2-diphenyl-1-picrylhydrazyl free radical scavenging and β-carotene–linoleic acid system methods, respectively. The results were compared to those of BHT as synthetic antioxidant. Total phenolic content of the methanol extracts ranged from 92.72±1.83 to 148.00±0.92 mg GAE/g extract. The order of the antiradical capacities of the species was found to be *BHT* > *A. kotschyi* subsp. *kotschyi* > *A. setaceae* > *A. biebersteinii*> *A. wilhelmsii* > *A. lycaonica* > *A. coarctata*. The methanol extract of *A. kotschyi* subsp. *kotschyi* possessed the highest antiradical activities and the highest total phenol content. A significant relationship between antioxidant capacity and total phenolic content was found, indicating that phenolic compounds are the major contributors to the antioxidant properties of these plants.

PP-132

Evaluation of antifilarial activity in roots of *Plumeria alba*

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Plumeria alba (white champa), commonly known as White Frangipani in English, Veyvi in Telgu, Perumal arali in Tamil, is a small tree, 4-5 m high, occasionally grown in gardens as ornamental plant throughout India (Wealth of India). The fruit is edible, the latex is applied to ulcers and scabies, and the seeds are said to possess haemostatic properties (Wealth of India), roots are cathartic and branches are used as abortifacient (Watt, 1889-96, Dictionary of Economic products of India, Vol, 1-6). The bark contains α and β- amyrins and their acetates, plumieride, scopoletin and β- sitisterol (Wealth of India). The medicinal properties of this plant have yet to be thoroughly investigated. In the present study, we describe the antifilarial potential of roots of *Plumeria alba (P. alba)* using *Setaria cervi (S. cervi)* worm as study model. The effect of petrol extract of roots of *P. alba* was studied on the spontaneous movements of the whole worm (w.w.) preparation and nerve muscle (n.m.) complex of *Setaria cervi* (*S. cervi*). The petrol extract of roots of *P. alba* caused inhibition of spontaneous movements of the w.w. and n.m. complex characterized by initial stimulation followed by reversible paralysis. Petrol extract of roots of *P. alba* possess antifilarial activity.

PP-133

Antioxidant activity of citronella oil and its major component as a marker

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According to bioactivities of several essential oils, citronella oil (Citronella winterianus Jowitt) appeared to have a potent antioxidant activity. However, the components of citronella oil are complexity which could be leading to difficulty for oil quality control. The aim of this study was to find an antioxidant activity marker for citronella oil by investigating antioxidant activity of citronella oil and it major components.The components of citronella oil were identified by GC/MS spectrophotometry. Its major components were selected and free radical scavenging activity and lipid peroxidation activity of citronella oil and its components were carried out using 2,2-diphenyl-1-picrylhydrazyl test (DPPH) and thiobarbituric acid assay (TBARs). GC/MS chromatogram demonstrated that three major components of citronella oil were identified. The major components of citronella oil were composed of 31.8% of citronella, 13.2 % of β-citronellol and 19.3% of geraniol. According to their IC_{50} of the three major components tested, β-citronellol appeared to have the most effective antioxidant activity. Its IC_{50} of free radical scavenging activity and lipid peroxidation inhibition was at 80.8 and 0.0002 μl/ml, respectively. However, the antioxidant activity of citronella oil appeared to be greater than the activity of each component and that of vitamin E acetate and BHT. It is possible that major components and minor compounds may act together synergistically to contribute to the oil activity.

Due to the complexicity of the components in citronella oil, β-citronellol could be used as a marker for antioxidant activity of citronella oil. However, it is important to investigate the activity of the oil and its components in more models for testing antioxidant activity to support this study.

PP-134

The antihypertensive effects of *Olea africana* phytotherapy

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Hypertension is becoming an increasingly common global health problem, despite the use of many synthetic drugs for this condition. *Olea africana* is one of the many phytotherapies that has been used indigenously to modulate hypertension for years. In the current study, the inhibitory activity of ethanol extracts of *Olea africana* (OAE), pure oleanolic acid (OA), aqueous extracts of *Olea africana* (OAW) and the synthetic drug Captopril (Cap) on angiotension converting enzyme (ACE) levels in whole blood in normotensive and hypertensive rats were compared *in vitro*. The results indicate that OA produced mild inhibitory activity of ACE levels, while Captopril, OAE and OAW produced more significant inhibition effect. The Cmax of Captopril was 0.04mg/ml, which reduced ACE levels to 976.87±25.38pg/ml (control level in normotensive rats was 1172.24±28.62 pg/ml) and 1397.52±87.95 pg/ml (control level in hypertensive rats was 1810.36±32.11 pg/ml). The peak inhibition effect in normotensive and hypertensive rats was observed in OAW at dose of 1.00mg/ml, which reduced ACE levels 28.94±5.27% and 34.01±9.89%. In conclusion, aqueous and ethanol extracts of *Olea africana* produced greater lowering of ACE levels compared to Captopril and OA. OAW showed most significant ACE inhibitory effect among all the four tested reagents. Hence, further research on the anti-hypertensive effects of *Olea africana* extracts is recommended.

PP-135

Biological activities of *Salvia mirzayanii* fractions by using c18 cartridge

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Salvia mirzayanii is one of the members of Labiatae family which is indigenous of Iran. In this investigation, the antioxidant activities of *Salvia mirzayanii* fractions were investigated by using DPPH radical scavenging and inhibition of lipid peroxidation. For rapid fractionation, the ethanolic extract of plants was loaded on C18 cartridge. The column was eluted with water and methanol, respectively, and two fractions were collected. The fractions were subjected to radical scavenging assay by DPPH. The IC_{50} (concentration of extract scavenge 50 % DPPH radical) of fractions 1 and 2 were (254.2±13.2 μg/ml) and (245.07±22.45 μg/ml), respectively. On the other hand, the IC_{50} of BHT and gallic acid as antioxidant standards were (63.1±0.9 μg/ml) and (2.49±0.6 μg/ml) respectively. Crude extract of *Salvia mirzayanii* could not inhibit the *β*-carotene peroxidation. A negative value in ACC (antioxidant activity coefficient) showed the plant extract has prooxidant activity. In lipid peroxidation inhibition, ACC of fractions 1 and 2 were (266.5±26.5) and (268.5±26.5) respectively. However, by using C18 cartridge is possible to fractionate the crude extract of plants and the biological activities of these fraction can be investigated.

PP-136

In vitro antioxidant activity of some *Veronica* species from Serbia

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The aim of our investigation was to evaluate the antioxidant activity and total polyphenol contents of different extracts prepared from the flowering herb of three *Veronica* species collected in Serbia (*Veronica jacquinii* Baumg., *Veronica teucrium* L. and *Veronica urticifolia* Jacq.). The extracts were obtained with solvents of varying polarity (water, methanol, 70% aqueous acetone). Antioxidant properties of the extracts were assessed by determination of ferric-reducing antioxidant power (FRAP assay) and determination of DPPH-free radical scavenging ability (DPPH assay), with respect to their total polyphenol content, against butylated hydroxytoluene (BHT), which was used as positive control. The concentrations of plant extracts required for scavenging 50% of DPPH radicals ranged from 12.58 μg/ml to 66.34 μg/ml, whereas the FRAP values were found to be between 0.97 mmol Fe^{2+}/g and 4.85 mmol Fe^{2+}/g. The strongest antioxidant activity was detected in the extracts of *Veronica teucrium*, which corresponds to the highest total polyphenol contents. Among the examined herbal extracts, 70% aqueous acetone extracts exhibited the most potent antioxidant and free radical scavenging activity. These results suggest that investigated *Veronica* species could become a rich source of natural antioxidants.

PP-137

Influence of *Filipendula hexapetala* gilib. (Rosaceae) flowers to functional status of hepatic antioxidant enzymes in rats

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Methanol extract of *Filipendula hexapetala* Gilib. (Rosaceae) flowers was evaluated for its *in vitro* antioxidant potential by assays for ferric-reducing antioxidant power (FRAP), DPPH-free radical scavenging activity (DPPH) and the influence to lipid peroxidation in liposomes (LP), with regards to the contents of total polyphenols and flavonoids. Considerable *in vitro* activity was observed in all test-systems, comparable to that of BHT, but lower than the activity of ascorbic acid, rutin and quercetin, used as positive control substances. The *in vivo* effects were evaluated in several hepatic antioxidant systems (activities of LPx, GSH-Px, Px, CAT and XOD, as well as GSH content), after the treatment with studied extract in different doses, or in combination with carbon tetrachloride (CCl_4). Pretreatment with the *Filipendula hexapetala* extract inhibited CCl_4-induced liver injury by decreasing LPx and increasing GSH content in a dosage dependent manner, bringing the levels of all antioxidant enzymes to control values.

PP-138

Antimicrobial activity of four spontaneous species against a collection of plant pathogenic bacteria

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Aqueous extracts from leaves and root of four spontaneous species; *Calendula arvensis, Plantago lanceolata, Euphorbia helioscopia* and *Urtica urens* were essayed for their antimicrobial effect on a strain collection of plant pathogenic bacteria ; *Agrobacterium tumefaciens, Agrobacterium vitis, Ralstonia solanacearum , Xanthomonas axonopodis* pv *citri*, *Erwinia amylovora, Pectobacterium carotovorum* and *Clavibacter michiganensis* subsp *michiganensis* . Analysis of *in vitro* antagonistic activity of the plant species was tested with the method of disc-diffusion on an agar medium. Results of *in vitro* inhibition revealed that the spontaneous plant species inhibit the growth of the different bacterial strains and displayed different levels of the antimicrobial activity. This suggests a promising use of these plant species as both a green manure and natural alternative control to synthetic chemicals which are ineffective on plant pathogenic bacteria especially in integrated pest management for crops in organic agriculture.

PP-139

Antioxidant activity of *phlomis lycia* d. Don leaf extracts

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The genus *Phlomis* L. comprises over 100 species including herbs, shrubs and sub-shrubs of the family Lamiaceae. *Phlomis* L. is a well-known genus in Turkey and is represented by 34 species in Turkish flora, of which 21 are endemic. Some of the *Phlomis* species are used as tonics and stimulants in Anatolia and are locally known as "çalba" and "şalba" [1, 2]. *Phlomis lycia* D.Don is growing in Antalya, Muğla, Aydın province and it is named as "deli şalba" and used for stomach pain, appetizing, stimulant, carminative, tonic, dyspeptic complaint [3].

In this work, two extracts (methanol and water) of *P. lycia* were studied to assess their antioxidative potential. For this, total antioxidant activity [cupric reducing antioxidant capacity (CUPRAC) and *ferric thiocyanate* (FTC) methods] and radical scavenging activity (DPPH method) of extracts were performed. Moreover their total phenolic content was determined by the Folin-Ciocalteu method and total anthocyanin content by the pH differential method. Besides, reducing power and the total proline content of the extracts also determined.

CUPRAC result were expressed as Trolox equivalent ($TEAC_{CUPRAC}$) and water and methanol extracts of *P. lycia* showed lower (0.045 and 0.22, respectively) CUPRAC values than that of BHT (7.59) which is known as a high antioxidant compound. With FTC method, methanolic extract of *P. lycia* showed high antioxidant activity (% 71.57 inhibition) compared with BHT (% 97.35 inhibition). However, water extract of *P. lycia* exhibited low antioxidant activity (% 33.53 inhibition). DPPH radical scavenging activity was expressed as IC_{50} values and lower IC_{50} values means higher DPPH radical scavenging activity. Both methanol and water extracts were present high DPPH radical scavenging activity (15.54 and 11.44, respectively).

Phenolic and anthocyanin contents of methanolic extract of *P. lycia* were higher than that of water extract and these results were in accordance with their antioxidative potentials. Both water and methanol extracts showed very low reducing power (6.08 and 11.27, respectively) in comparison with ascorbic acid, but they displayed high proline content (5.87 mg/g and 11.41 mg/g, respectively).

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PP-140

Effect of drought stress on germination factors of four improved cultivars of german chamomile (*matricaria recutita* l.)

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Chamomile (Matricaria recutita) is a highly valuable medicinal and aromatic plant of Asteraceae family and its anthodia used frequently in pharmaceutical and cosmetic industries. The aim of this study was the evaluation the effect of drought stress induced by Polyethylene Glycol 6000 (PEG) on germination percentage, germination rate, plumule and radicle length of four improved cultivars of German chamomile. The experiment in completely randomized design with two factors in three replications was conducted. The first factor included 10 drought levels (0, -1, -2, -3, -4, -5, -6, -8, -10 and -12 bar that zero bar as control) and second factor included 4 improved cultivars of chamomile. Seeds of Bona (diploid), Germania (diploid), Goral (tetraploid) and Lutea (tetraploid) cultivars were prepared. According to the results, different levels of drought stress and type of cultivar had significant effect on measured characteristics ($p<0.01$). Results also showed that all the measured characteristics were decreased significantly. Germination percentage in -4 and -6 water potentials decreased to 48 and 16 percent and germination rate decreased to 5,7 and 1,8 and in -8, -10 and -12 bar no seeds germinated. Plumule length decreased more than radicle length in drought stress. Different cultivars of chamomile with diversity in genotype have different responses to drought stress. It seems that Lutea and Bona cultivars have the highest drought tolerance in germination stage.

PP-141

The effect of different level of water stress on morphological characteristic and essential oil content of sweet basil (*Ocimum basilicum* l.)

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A pot experiment in randomized complete blocks design (RCBD) with six treatments in four replications was conduced to study the effect of water stress on physiomorphological characteristic and essential oil content in basil (*Ocimum basilicum*). The irrigation treatments for induction of water stress were: A: (125cc 12 h), B:

(250 cc 48 h), C: (125 cc 48 h), D: (250 cc 48 h), E: (250cc 72 h), F: (500 cc 72 h). According to the results of statistical analysis, different levels of water stress had significant effect ($P<0.01$) on measured factors (fresh and dry weight, plant height, leaf number, essential oil content). The results showed that the highest fresh and dry herb was produced in treatment B (250 cc 48 h) and the lowest fresh and dry herb was produced in treatment E (250cc 72 h). The treatment B in comparison with treatment A did not show a significant difference, that is with increasing of irrigation time and decreasing of water content, there were no significant effect on growth factors, in the other hand, with increasing of irrigation time and water content in treatment F, yield was higher than of the treatments except than treatments A, B. These results showed that water stress influenced the yield and essential oil content.

PP-142

Investigation of the effect of osmopriming on germination factors of coneflower (*Echinacea purpurea*)

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The Purple coneflower (Echinacea purpurea) is a valuable medicinal plant that has poor seed germination. In order to investigate the effects of Osmopriming on Seed Germination qualifications of this medicinal plant, a factorial experiment based on Completely Randomized Design (CRD) was conducted. The experiment was consisting of 2 factors with 4 replicates. The first factor was KNO3 solution at 4 levels: 0 (Distilled water), 0.15 mol/liter, 0.3 mol/liter and 0.6 mol/liter. The second factor was Soaking period time length at 4 levels: 0 (non-soaked seeds as control), 24 hours, 48 hours and 72 hours. The results showed that the osmotic solution's viscosity, have a significant effect on Seed Germination Percentage, Seed Germination Speed and the Initial Germination's Speed (G50). But this effect was insignificant on the monotony of germination (G10-90). Furthermore, the effect of soaking time length has a significant effect on all of the qualifications. But the mutual effect of the factors was significant only on Seed Germination Percentage and Seed Germination Monotony (G10-90). Totally, the best treatment to improve seed germination factors, founded 24 hours soaking in 0.15 mol/liter solution of KNO3. By using this treatment, the germination factors reached to: Seed Germination Percentage 80.25 % , Seed Germination speed 3.92 days, Seed Germination Monotony (G10-90) 6.5 days and Initial Seed Germination Speed (G50) 7.5 days.

PP-143

Effect of planting dates on morphological characteristics, yield and essential oil content of *Achillea millefolium* subsp. Millefolium cultivated in mashhad climatic conditions

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Planting date has important effect on plant development and also affect on active substance of medicinal plants. A experiment in randomized complete blocks design (RCBD) with four treatments include four planting date (6 July, 1 August, 7 September and 7 October) in three replications was conduced to study the effect of planting date on morphological characteristic, yield and essential oil content of Achillea millefolium subsp. millefolium L. seed used in this research was Achillea wild population of Karaj. During the growing stage and the end of experiment following factors were measured: time to bolting, flowering date, plant height, lateral inflorescence number, flower diameter and height, flower yield, essential oil percent and yield and plant yield. Our results indicated that planting date affect whole measured factors ($p<0.01$). Essential oil yield affected by planting date and the highest essential oil yield produced in 7 October and lowest content produced in 1 August planting date. In conclusion, 1 August is the best date for sowing of the plant.

PP-144

The investigation shading effects on stages of emergence and establishment of *Valeriana officinalis* in the bed and its production in the farm

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As the seeds of *Valeriana officinalis* are very weightless and they are sensitive against light day and moisture moreover the dark is a resistance for germination. The seeds must plant on surfaces of soil. The statistical design was factorial in base of randomized completed. The treatments were cover system (cloth, plastic cloth, plastic and control) and sowing methods (Hand broadcasting and row seeding).

The surface of soil was moisture till emergence of seed. We study emergency, establishment and phenology of plant in the bed. We contemplate the stages of growth the root were harvested and dried then extracted the essence in farm measure.

The result show, cover systems had a highly significant difference (with 99% probability) but sowing methods had not a significant difference. The mean of cloth cover (53.12 %) was the highest emergence and the mean of plastic cover (22. %) was the lowest emergence. Interact of sowing method and cover system show; Hand broadcasting method with cloth cover had the highest emergence (56.56 %) and row seedling with plastic cover had the lowest emergence (20.44 %). Thus providing enough moisture in the stage of germination and emergence is very important to establish the seedlings. As a result; using from cloth for shading and sunny can be useful.

The dry yield of roots was 2.5 (t/h) with 1.5% essence and it can produce 25 (kg/h) seed.

PP-145

Identification and consideration of ecological and phenological characteristics of 10 important essential species of khorasan province

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Essential oils use in medicinal, cosmetic, and hygienic productions. In this study we contemplated the local investigation by using maps (1/50000 and 1/250000) then determined the position of distribution of 10 species were the important essential plants in the province. With reforming distributed maps of essential plants with the maps of cover plants were determined the climate, degree of heat, evaporator, raining, gradient, altitude, ability of ground and geology for each species.
With determining the distributed points and areas of essential species on the map, it is possible to revive and develop to cultivate them in the dry land and to produce them extensively.
In continuing of considering we determined the period of vegetative and reproductive and compared the yield of them in the agronomy and wild condition.
From 10 cultivated species 8 species were succeeded, they were the following: *Salvia lerrifolia* (17gr/p) *Thymus transcaspicus* (22.39 gr/p), *Teucrium polium (*72.75 gr/p) and *Ziziphora clinopodioides* (24.8gr/p). *Bunium persicum, Ferula gummosa, Dorema ammoniacum, Ferula assa-foetida* had a suitable growth but they did not reach to producing because they are perennial plants and they need a period time to produce. *Zataria moultiflora* stabelished in the field but the plant did not continue its growth. *Stachys lavandifolia* did not emerge in the seedbed because the collected seeds were hollow.

PP-146

The investigation on different cutting methods of tuber on the yield of gum production and to introduce a suitable method for exploitation of *Ferula gummosa* in khorasan province of Iran

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Ferula gummosa is one of the most important medicinal plants in rangelands of Iran. Importance of this design for the reason of preventing of destruction trend of species by human factors and presence of equal exploiting with physiological potential and rehabilitation power of plant is felt. Investigations include; Determination of plant , measurements of leaf area cover (L.A.C), Diameter of basalarea and count of leaf relationship with mono-bush yield, using different methods of cutting (Longitudinal, Althtudinal and basalarea), Achievement of different period of exploration (Whole of year, year one year and year two year) at format of nested statistical design with ten replication with two slope (south and north) and finally determination of amount of Gum production, survey of surviving and trend of mortality of plant in each of treatments above.
This plant mainly is distributed in north and central regions of Khorasan with elevation is ranged 750-3000 m. Survey on determination of plant age, by using of L.A.C, 5-6 years old bushes were distinguished suitable for exploitation. Between north and south slopes existed significance difference, so that south slopes included high production between times of cutting during yearly exploiting existed very significance difference and most production were obtained in third cutting. Survey on cutting methods showed that longitudinal cutting had the least damage to surviving abut yield of Gum *per* unit bush comparative with other method no significant.

PP-147

Identifying the biological factor of manna producer and the plant species of Camel's thorn in khorasan province of Iran

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Alhagi spp. was carried out some tests in order to establishment of manna product by a living thing. Such as investigation on how activity of insect on plant and relation manna production, chemical treatment in order to controlling activation insect on plant, anatomical situation plant (stem and leaves), identification and study of biology productive insect manna it's mechanism.
Identification of sugars and existing in plant tissue, comparison between market manna and exudates manna of the insect. Also specimen of kamel's thorn from different species either productive or nonproductive was collected and identified. Furthermore, distribution of provenances of Kamel's thorn throughout the province was recognized. Finally exploitation of manna was investigated.
The result indicated *Poophillus nebolusus*, was identified as a causal of productive manna named taranjebin. The manna was obtained from feeding function of the insect in plant and fecal exudation and none of the probable factors of production was affirmed. Also, *Alhagi persarum* was identified as a host plant manna taranjabin. This species is a wide distributed plant and the most provenances were located in central and southern Khorassan, where as northern regions of the province, because like optimum conditions for living the insect is very limited.

PP-148

Response of different populations of fennel (*Foeniculum vulgare* mill.) To different levels of nitrogen fertilization

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Nitrogenous fertilizer as the most important element of the plant nutrition in the agricultural ecosystems has vital effect on the physiologic processes and different yields of the genotyps and the plant varieties. This investigation carried out in fennel (*Foeniculum vulgare*) in order to evaluate responses of different genotypes to different levels of N fertilization. Experiment was done in split plot design with three replications. Main factor was different levels of N fertilization (0, 40, 80,120 and 160 kg/ha), and subfactor selected different populations (Esfahan, Tehran, Yazd and 11486). Measured characters were including seed yield per hectares, 1000-seed weight, and harvest index, number of umbrella per plant, number of seed per umbrella, seed length, plant height and percentage of essential oil. Analysis of variance showed significant differences for all treats exception for 1000-seed weight and plant height in different levels of N fertilization. Differences among populations were highly significant for all traits. Interaction N fertilization and Populations for seed yield per hectares was not significant and

mean comparison showed that the highest seed yield obtained in 160 N kg/ha and the best populations were populations of Esfahan and Tehran. The highest and lowest 1000- seed weight belonged to Tehran population and Yazd, respectively. Range of essential oil content among populations varied between 1.50 to 2 percent. The highest essential oil belonged to 11486 populations and the lowest essential oil belonged to Yazd population. Result of this experiment suggests that response of populations to different levels of N fertilization was been highly different and all population with increasing of consume of N levels, seed yield and essential oil didn't increase equally.

PP-149

Effect of liquorice, fenugreek and ga3 on yield of caraway (*Carum carvi* l.)

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The field experiment was conduct out at silty loamy clayey soil during the two successive seasons 2007/08 and 2008/09 to investigate the effect of liquorices fenugreek extracts and GA3 on yield characters. RCBD was used under factorial arrangement by two factors first was water, liquorices ,fenugreek extracts and GA3.Second,was the stage of spraying for one time vegetative, flowering and vegetative+ flowering stage. The results revealed that the spraying of GA3 on flowering stage gave highest conc. of carvone of 53.08% and oil of 3.00% for each season. The spraying on vegetative+ flowering gave highest oil% of 2.17 in first season. But in the second season was 2.79% under the spraying on vegetating. The fenugreek was superior in fruit yield and essential oil yield of 502.7 and 530.7 kg/hect .and 9.74 and 13.78L/hect. for each season respectively. The spraying on vegetative had the highest fruit yield and essential oil yield of 486.8 and 485.19kg/hect and 10.43 and 13.68L/hect. for each season respectively.

PP-150

Medicinal and aromatic plants farming under drought conditions

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Drought stress is especially important in countries where crop agriculture is essentially rain-fed. Drought stress causes an increase in solute concentration in the environment, leading to an osmotic flow of water out of plant cells. This in turn causes the solute concentration inside plant cells to increase, thus lowering water potential and disrupting membranes along with essential processes like photosynthesis. These drought-stressed plants consequently exhibit poor growth and yield. In worst case scenarios, the plants completely die. Certain plants have devised mechanisms to survive under low water conditions. These mechanisms have been classified as tolerance, avoidance or escape. Also, medicinal and aromatic plants have been an integral part of our daily life for thousands of years. There are cave paintings in which medicinal and aromatic herbs are depicted. To this day, modern research continues to discover health benefits of plants while illustrating the importance of preserving our ecosystem. This review may give applicable advice to commercial farmers and medicinal and aromatic plants researches for management and proper use of water in medicinal and aromatic plants farming under drought conditions and increases quantity and quality characteristics of medicinal and aromatic plants in arid and semi-arid areas.

PP-151

Planting borage (*Borago officinalis* l.) By using organic fertilizer

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Borage (*Borago officinalis*) is a traditional medicinal and culinary herb native to the Mediterranean region and first was cultivated in Turkish Asia and Syria, and later in Spain by the Moorish Arabs. Becausae of global tendency in the world, to reduce the use of synthetic fertilizers, and pesticides, in planting different crops as a whole, and specifically, planting medicinal plants, so, we used cow manure as an organic fertilizer in planting of borage, without use of any insecticides. Borage seeds were planted in April, in an experimental field of Faculty of Agriculture, Razi unversity, Kermanshah, Iran following RCB design with four treatments of cow manure, successively 0,10,20,30 kg per plot and 4 replicates. MSTAT-C was used for analysis of variance, and Duncan's DMRT for comparing means. Statistically speaking, no significantly difference, was observed between weight of 1000 seeds of borage, in different treatments. Harlequin bugs(*Murgantia histrionica*) is for the first time to be recorded as the pest of borage in Iran.

PP-152

Study of different levels of irrigation stress (tension), nitrogen and density on the milk thistle's quantitative and qualitative characteristics

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Milk thistle is one of the significant medical plants which have a special value in the modern medical industry. The purpose of the research was to investigate the effect of different levels of irrigation tension, Nitrogen and density on the yield and component yield. This research was carried in split split plot design with three replications. The main plot was included of three levels: 50, 100 and 150 ml vaporization from the vaporization dish. The subplot was included of three levels of non-fertilizer, 75 and 150 kg/ha N fertilization and the sub sub plot were including the density of distance between rows 20, 40 and 60 cm. The results showed that the different levels of irrigation tension, Nitrogen and density had significant differences on the height, the performance of the seed/m^2, the performance of the seed in each plant and also the harvest index. The maximum height (173 cm) refers to tension 50 ml , density 20 cm and 150 kg/ha nitrogen/ha. The maximum performance of the seed/m^2 (476.75 gr) was related to tension 50 ml, density 20 cm and 150 kg Nitrogen/ha. The maximum performance

of the seed in each plant (26.35 gr) is measured on irrigation tension 50 ml, density 60 cm and 150 kg Nitrogen. The maximum harvest index is achieved by tension 50 ml, density 60 cm and 150 kg Nitrogen/ha. The minimum height (131.5 cm) is related to tension 50 ml, density 60 cm and non-fertilizer. The minimum performance of the seed is related to tension 150ml, density 60 cm and 150 kg Nitrogen/ha. The minimum performance of the seed in each bush is achieved by tension 150ml, density 40cm and 150 kg Nitrogen. Regarding to the achieved results, we can conclude that tension, Nitrogen and density have a significant role in improving the performance of the seed/ m^2.

PP-153

Evaluation of irrigation and n-fertilization levels on some of quantitative traits of *Silybum marianum*

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Efficiency water is the most factors in decreasing of yield per area in dry land and semidry lands. Water stress affects some process in plant including photosynthesis, development and division cells, transformation of nutrition. Nitrogen deficiency stops growth due to decreasing of division cells, also increasing nitrogen due to development biomass in plant. *Silybum marianum* is an annual plant belongs to composite family which used as a cure of liver disease and liver cancer. This study was done in order to irrigation evaluate and N-fertilizer level on quantitative traits at farm of Jilan Abad in split plot design with three replications on *Silybum marianum*. Irrigation levels were including 50, 100 and 150 ml water evaporate from class A pan and N-fertilizer levels were including control, 75 and 150 kg/ha. Number of seed per capitol, number of capitol per plant, dry matter of capitol, height plant, leaf area, seed yield per plant and seed yield per m2 were measured. Analysis of variance showed that stress had significant differences for number of seed *per* capitol, number of capitol *per* plant, leaf area, seed yield *per* plant and seed yield *per* m^2 ($p<0.01$) and plant height ($p<0.05$). N fertilizer had a significant effect on all traits exception dry matter of capitol. Interaction n*irrigation on treats showed significant differences for all traits exception for number of seed per capitol. Mean comparison of interaction N*irrigation showed that the highest plant height obtained on 50 ml class A pan and 150 kg/ha N. Seed yield *per* plant varied from 5.45 to 15.43 gram. The highest seed yield per plant and seed yield *per* m^2 obtained at 100ml evaporate and 150 kg/ha N, the lowest obtained at 50 ml evaporate and control nitrogen (no fertilization). Therefore, to obtain of maximum yield *per* m^2, should consume suitable N-fertilization and irrigation levels.

PP-154

Determination of some important charactertistics of some basil ecotypes (*Ocimum basilicum* l.) In Samsun ecological conditions

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This study was conducted in Samsun ecological conditions in 2005. İn this study, 4 basil accessions, cultivated in different locations of our country were observe for phenological observations. Averages, Standard and quality characters of plant accessions were found out and some morphological and quality characters of both accessions were also analyzed statistically by simple methods.

Research showed that emergence period was between 13-14 days, emergence rate- 52 – 96 %, blooming period from the begining of sowing- 87 - 99 days, 1000 seed weight 0.69 – 1.99 g between, plant height 7-47 cm between, stem weight 4.63-12.09 mm, fresh herba yield 49.26 - 359.46 g between and drog herba yield 9.03-84.14 g between, volatile oil ratio- 0.35-0.95 %. Proportion of the important components of the volatile oil was also determined as following: Estragole- 31.67-40.79 %, Z-Citral-10.03-18.03 %, Citral- 3.23-24.59 %, B-caryophyllne- 5.09-7.97 %.

PP-155

Determination of some characteristics in ecotypes of balm (*Melisa officinalis* l.) Existing in middle and east black sea flora

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This study was conducted under Samsun ecological conditions in 2005. In this study, 8 balm are different three subspecies (*subsp. officinalis, subsp. altimissia, subsp. inadora*) accessions collected from Black Sea Region were observed for some phenological observations. Averages, Standard and quality characters of plant accessions were found out and some morphological and quality characters of both accessions were also analyzed statistyically by simple methods.

Research showed that emergence period was between 15-21 days, emergence rate- 5.3 – 75.5%, blooming period from the begining of sowing- 108-143 days, 1000 seed weight 0.40-0.65 g between, stem weight 5.37-7.54 mm, plant height 17.30 -23.30 cm between, number of secondery branch 41.36-100.41 cm, between, number of secondary branch 17.65 – 29.26 between, fresh herba yield 164.34 – 481.45 g between and drog herba yield 54,30 -149,65 g between. Proportion of the important components of the volatile oil was also determined as following: β-Caryophyllene 7,61-39,06 %, Caryophyllene oxide 1.72-20.34 %, Citral 1,1-35.97 %, Z-Citral 0.8-28.93 %, Germacrene-d 0.84-24.02 %.

PP-156

Standardization of cultivation practices for rhubarb (*R. Australe* l.)- An endangered medicinal plant species of Kashmir Himalaya

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Many medicinal plant species are being extracted from the wild source at an alarming rate. This has resulted in the loss of the biodiversity of the species. In the present investigation an attempt was made for the standardization of the cultivation practices for the requirement of organic manure, nitrogen and phosphorus in order to save the species from extirpation. Application of organic manure and higher levels of inorganic fertilizers has

resulted in increase in the root biomass, although the effect of their interaction was non-significant. Maximum dry root biomass (6012.00 kg ha^{-1}) was observed in treatment M_1 P_2 N_2 (20 tones poultry manure ha^{-1}, 100 kg phosphorus ha^{-1}, and 150 kg nitrogen ha^{-1}) compared to the lowest yield (2200.00 kg ha^{-1}) in treatment M_3 P_0 N_1. Poultry, sheep or farmyard manure when in combination with higher levels of nitrogen (150 Kg ha^{-1}) and phosphorus (100 kg ha^{-1}) resulted in increased yield of root. Furthermore poultry manure in combination with higher level of nitrogen and phosphorus showed the highest dry yield of root $plant^{-1}$ in contrast to sheep and farm yard manure receiving the same combination of inorganic fertilizers.

PP-157

Conservation of the endangered medicinal plants of the Kashmir Himalayas

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Medicinal plants are the most important source of life saving drugs for the majority of the world's population. India is amongst the most important medicinal plant resource collection centers of the world. Over 500 million people receive the benefits of traditional knowledge of well documented and standardized systems of medicine. In India, 1814 plant species have been identified as threatened and of these, over 113 taxa occur in Indian Himalaya. Around 90 per cent of medicinal plants used by Indian industry today are collected from the wild. The valley of Kashmir (situated in the lap of Western Himalaya) harbours about 500 medicinal plant species, of which More 100 species are regarded as high potential medicinal plants growing at different altitudes. The region of Kashmir Himalaya is extremely rich in medical and aromatic plant species. But due to years of unwise use, the availability of medicinal plant materials in desired quantity and quantity have become difficult. Some of the medicinal plants have been subjected to heavy collection from the wilds due to ever increasing demand. The rate of their exploitation exceeds the rate of regeneration under natural habitat conditions. This implies that immediate measures be adopted for their biodiversity conservation. The most important endangered medicinal plants of the region include: *Picrorhiza kurroa* Royle ex Benth. (Scrophulariaceae), *Rheum australe* D. Don, *Aconitum heterophyllum* Wall. Ex Royle., *A. violaceum* Jacq. Ex. Stapf, *Sassurea costus, Valeriana walchii, Arnebia absenthium, Podophyllum hexandrum* Royle. In the present investigation, an attempt was made to standardize the cultivation practices for *R. australe* and *P. kurroa* using different levels of organic manure (farmyard manure, sheep manure, and poultry manure), nitrogen and phosphorus in split- split design. The results of the investigation are discussed in detail.

PP-158

Effect of chicken manure, soil type and salinity on growth and yield of spearmint (*Mentha spicata* l.) Grown in sudan

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A pot experiment was carried out for the growing season 2002-2003, at the demonstration farm of the Medicinal and Aromatic Plants Research Institute (Khartoum, Sudan), to investigate the growth response and oil content of Spearmint (*Mentha spicata* L.) as affected by two chicken manure rates added as follows: control treatment 0.0 and 16 tons/ha and two salinity levels (Tap water EC=0.26 dsm-1 and saline water EC=1.0 dsm^{-1}), were examined in two Vertisol soils, namely, Shambat soil and Soba soil, where Soba soil suffer from accumilation of salts which adversily affects its productivity. The treatments were arranged in a split-split plot design with three replicates where salinity levels were assigned to the main plots, soil types assigned to the sub-plot and chicken manure assigned to the sub-sub plots. The plants were harvested two times, the first cut after two months and the second five weeks later. Parameters measured include, plant height, number of branches/ stem, fresh and dry hebage yield, roots fresh and dry weight and oil content. There was a significant effect of soil type, where Shambat soil out yielded Soba soil and salinity found to reduce all measured parametres significantly while addition of chicken manure resulted in a significant increase in all parameters, having a positive effect in alliviating salinty effect. Hence reclamation of marginal lands with chicken manure found to improve both growth and yield attributes of spearmint.

PP-159

Effects of weed interference on grain yield and yield components of isabgol (*Plantago ovata*)

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Isabgol (*Plantago ovato*) is an irrigated medicinal plant which grows well on light soils. Weed infestation can limit Isabgol performance in the field. Thus, a field experiment was carried out in 2003, to investigate the effect of weed interference on yield components and grain yield of isabgol. The experiment was designed as randomized complete blocks with 4 replications. Treatments were two series including: 1) control of weeds up to 20 (T_1), 30 (T_2), 40 (T_3) , 50 (T_4) and 60 (T_5) days after sowing and a weed free treatment (T_6), and 2) weed interference up to 20 (T_7), 30 (T_8), 40 (T_9) , 50 (T_{10}) and 60 (T_{11}) days after sowing and a weed infested treatment (T_{12}). The results indicated that ears per plant, grains per plant, 1000 grains weight, biological yield, grain yield per unit area and harvest index were significantly affected by weed interference. The number of ears per plant, grains per plant, 1000 grains weight, biological yield, grain yield and harvest index of isobgol were decreased with increasing weed interference duration. Reductions of yield and yield components of isabgol, were higher due to weed interference at early rather than at later stages of plant growth and development. Therefore, it is necessary to control weeds during vegetative stages of isabgol, in order to obtain satisfactory yield.

PP-160

Nutlet morphology of Turkish *ziziphora* l.

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The genus *Ziziphora* L. (Lamiaceae) consists of annual herbs, except *Z. clinopodioides,* and is represented by 6 taxon in the flora of Turkey: *Z. clinopodioides, Z. capitata, Z. persica, Z. tenuior, Z. taurica* subsp. *taurica, Z. taurica* subsp. *cleonioides*. They are strongly aromatic herbs and used as herbal teas and spices and for this reason they are important medicinal plants. Nutlet morphology of 6 taxa of Turkish *Ziziphora* species was studied using stereoscopic and scanning electron microscopy (SEM), and detailed description of nutlet morphological features for all examined taxa is provided and illustrated. Typical nutlets are oblong or narrowly obovoid. The surface sculpturing is slightly papillae. Seed coat composed of rounded or irregular polygonal cells which are undulate-ribbed in the edges. There is no knowledge about nutlet features of *Ziziphora* species in the Flora of Turkey. The unknown these nutlet features are given first time in here as detail.

PP-161

Critical weed control period in the field of isabgol (*Plantago ovata*)

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Isabgol is an annual herb that indigenous to Mediterranean regions and West Asia. Weed control has a high cost in the isabgol field. Thus, an experiment was conducted in RCB design with four replication in 2005, to investigate the critical weed control period in the field of isabgol (*Plantago ovata*). The first series of treatments were T_1, T_2, T_3, T_4 and T_5 for controlling weeds only during the first 20, 30, 40, 50 and 60 days after sowing, respectively. T_6 was control or weed free treatment. The second series of treatments were T_7, T_8, T_9, T_{10} and T_{11} for not controlling weeds during the early 20, 30, 40, 50 and 60 days after sowing, respectively. T_{12} was control for weed infested treatment. The results showed that for 5% and 10% of yield reduction, weed control was necessary during 21 to 52 and 26 to 38 days after isabgol sowing. The highest grain yield obtained from T_5 that was statistically similar with T_3, T_4 and T_6 treatments. Therefore, weed control after 40 days from sowing did not significantly affect isabgol grain yield. The lowest grain yield was obtained from T_{12} treatment. Grain yield under T_6 was not significantly different from that under T_7, because weeds and isabgol interference did not occur during critical period (21 to 52 days after sowing). Thus, weed control in the isabgol field is necessary at the early stages of growth, in order to prevent significant grain yield reduction.

PP-162

An ecological investigation in to the domestication of cultivated *Thymus transcaspicus* in different plant dates

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Identification of indigenous species and consideration on their agro-ecological characteristics and essential oils ratio are very important in different agricultural and natural ecosystem. There's an amazing amount of attention paid to the different species of thymus because of thymol and carvacrol. The most of *Thymus* species are anti flatulence, anti swelling, strengthening stomach, catch cold and also they contain anti fungous, antibacterial, and anathematic agents. There was selected a suitable farm in order to investigate on ecological characteristics, and sowing date of *Thymus transcaspicus*. There was measured some related items to causes of climate change, soil, plant cover, phenological phase and rate of essential oil in habitat and field condition. In order to study of agricultural characteristics, species after collecting of seeds from habitat the seeds were putted in germinator within at different temperatures (°C) as 5, 10, 15, 20, 25 and 30 with a replication of four. On-farm domestication, the seeds were cultivated directly in four dates (December, January, February and March) under randomized complete block design and the achieved data were analyzed by SAS software. The result showed that this species grows in mountains and high spot in Khorassan in altitude 1500 – 2800 meter in Binaloud and Hezar-Masjed Mountain. The climate of habitat for this species is infra-cool semiarid, cool and infra- cool Mediterranean, cool semi-humidity, cold and even infra-cool humidity. The soil analyses of habitat showed that *T. transcapicus* grows in loam and silt loam soils, in PH = 6.5 – 7.8, without gipsy, and salty and to contain organic material. In habitat, vegetative step for *T. transcaspicus* was last days of April, its flowering step was in the first days of June and ripening step was in middle of July. The rate of essential oil was 4% in habitat. The result of analyses of data was significant (5%) for temperature of germination, percent of vegetation, establishment of plant and vegetative yield. The date of cultivating wasn't significant. The most yield was related to third date of cultivation (February) and the less yield was related to first date of cultivation (December). The percentage of essential oil in agricultural condition was between 3.55% and 3.91% in different cultivation.

PP-163

Feasibility study for domestication of cultivated *Nepeta binaludensis*

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An investigation of agronomical and ecological particulars for endangered & indigenous medicinal plant species has been conducted in order to domesticate and cultivate *Nepeta binaludensis*. *Nepeta* species have active substances such as: germacren, caryophylen, linalool, nepetalactons and etc. There was measured some related items to causes of climate change, soil, plant cover, plant height, phenological phase and rate of essential oil in natural habitat condition. Seeds were collecting from habitat and planting in germinator with a replication of four. Seed was cultivated directly in five dates (December, January, February, March & April) and tree replication in complete block design. After the planting, phonological stages, essential oil

percentage, dry mater yield and essential oil yield was measured at the flowering time in field condition. Result indicated that *N. binaludensis* grows in mountain zone with altitudes 2000-2700 m, in semi step and mountains rangeland. *N. binaludensis* is distributed only in Binalud Mountain of Khorassan. Habitat soils were lightly, rocky and sand loam or loam. This species grow on non saline soils, with a natural PH, little organic mater and non Gipsy soils. Average of plant yield and essential oil rate, in habitat was 2.21% and 62.34 gr /plant. The highest germination percentage was recorded in temperature 20°C, and the lowest germination occurred in 10°C. There was a significant ($p<0.0$) for effect of sowing date on germination, vegetation & establishment percentage, essential oil yield and dry mater yield . The highest percentage of germination and establishment were occurred in the first planting date and cultivation in March but they were declined in the late planting date in April. Plant yield was different from 1008.8 – 2156.4 Kg/ha. Essential oil percentage was 1.8-2.03% in farm and 2.41% in habitat. The most of essential oil yield (38.79kg/ha) were produced at the first cultivation date and the lowest essential oil yield (20.40kg/ha) produced in the 3rd sowing date. The percentage and yield of essential oil were reduced in the second year of study.

PP-164

Influence of cultivation on the essential oils of genus *mentha* in terms of content and quality

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The aim of this work has been to set optimum cultivation technologies for selected species and varieties of the genus *Mentha - Mentha aquatica, Mentha longifolia, Mentha x piperita cv. Perpeta, Mentha cervina* with respect to quality and amount of the drug and essential oil obtained (effect of N application – herb ichor, irrigation). The tests were carried out on the experimental field of the Czech University of Life Sciences research station certified for Ecological Agriculture. The plant material (seedlings) was acquired from Crop Research Institute, Department of vegetables and special crops in Olomouc. Two main harvests of the plant material took place on 5.7.2009 and 25.8. 2009. A quantitative and qualitative chemical analysis of the dry mint drug was carried out. Then a determination of the essential oils in the plant drugs was performed. (*Menthae piperine* herba –the herb of mint) Distillation by water vapours, then stipulation of the essential oil components of the individual species, by the help of gas chromatography (GC). Components evaluated: menthol, menthon, menthofuran, isomenthon, pulegon, carvon. The highest essential oil content was found in the herb of plants fertilized by herb ichor (22.03 ml kg^{-1}). Generally, higher contents of the essential oil were found in *Mentha x piperita* cv. Perpeta 28.75 ml.kg^{-1}. The qualitative analysis has shown a significant difference in the contents of individual essential oil components of *Mentha x piperita* cv. Perpeta, *Mentha cervina* L., *Mentha longifolia* L. and *Mentha aquatic* L. The smallest amount of essential oil, 11 ml kg^{-1}, was found from stands of *Mentha spicata L.* that was fertilized with herb ichor. Our results imply that N-fertilization increases amount of mentholamunt and pulegon amount and lowers amount of menthone in essential oils of *Mentha x Piperita* L. In species of *Mentha longifolia L.,* N-fertilization did not affect amount of essential oils; its major component was carvon (as much as 80 %).

PP-165

A study of chamomile cultures in two cultures in two geographical areas in Romania

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Chamomile *Matricaria chamomilla* L., *Asteraceae*, is one of the best known medicinal plants. The study presents information concerning the culture capacity of chamomile in two different pedoclimatic areas: Timişoara and Cîmpulung Moldovenesc, for a period of 3 years. We aimed at establishing a cultivation technology in order to get a high-quality vegetal product in a biological system and we studied lands that had been left untreated chemically.

Sowing density was of the 200 pl/m^2, 300 pl/m^2, 400 pl/m^2 and 300 pl/m^2 spread type. Biometrical measurements aimed at: plants length, number of ramifications and number of inflorescences *per* plant. Average plants length was 40-45 cm in the Timişoara area and 70-77 cm in the Cîmpulung Moldovenesc area. The number of ramifications was 16.2-18.4 in the Timişoara area and 28-30 in the Cîmpulung Moldovenesc area. The highest number of ramifications per plant (28-29) was when sowed with a sowing density of 300 pl/m^2 spread in the Timişoara area. Data on crops were satisfactory in a biological system (3652 kg/ha green matter inflorescences and 754 kg/ha dry inflorescences), but inferior to the intensive system from Timisoara where we obtained 5002 kg/ha green matter inflorescences and 1029 kg/ha dry inflorescences.

The two geographical areas under study have favourable pedoclimatic conditions to the cultivation of chamomile. The two geographical areas under study, though different from the point of view of precipitations and temperature, have pedoclimatic conditions proper to the cultivation of chamomile with high content of volatile oil.

PP-166

Morphological, chemical and production characteristics of basil genotypes

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Morphological, chemical and production characteristics of new basil (*Ocimum* sp.) genotypes in Serbia were examined during the period of 2005-2009. The research subject were the following basil genotypes: *Genovese, Lattuga, Holanđanin, Fino verde, Compact, Lime, Cinnamon, Siam queen, Blu spice, Purple ruffles, Purple opal, Osmin* and *Holy red.*

Twenty-seven characteristic in all have been monitored according

to the UPOV methodology (TG/200/1, year 2003). As for production characteristics, fresh and dry herba proportion in kg/ha, fresh and dry herba proportion in % and essential oil quantity in l/ha were monitored. The chemical composition of basil genotypes was determined by means of GC/MS as well as their antioxidative potential (2,2-diphenyl-1-picrylhydrazyl DPPH free radical scavening activity).

The highest herba yield was obtained from the *Genovese* genotype, while the highest essential oil quantity was obtained from the *Siam Queen* genotype. Seventy-five components in all were identified in the essential oil, and according to its chemical composition, the following hemotypes were determined: linalool (*Genovese, Lattuga, Holanđanin, Fino verde, Compact, Purple ruffles, Purple opal, Osmin*), linalool-methyl cinnamate (*Cinnamon*), geranial (*Limè*), methyl chavicol (*Siam queen*), bisabolene (*Blu spice*) and caryophyllene (*Holy red*). The *Purple opal* genotype has shown the biggest antioxidative potential.

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PP-167

Peat of gaj as a component of the substrate for medicinal, aromatic and seasoning herbs nursery production

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In medicinal, aromatic and seasoning herbs nursery production, the choice of the substrate has an important role. Serbia is rich in peats, which are the main component of substrates for nursery production.

In the experiment, which was carried out in the Belgrade Faculty of Agriculture glasshouse during the period of 2008-2009, dark lowland peat of the South Banat, Gaj village, was used as the basic supstrate mixture for nursery production.

Agrochemical characteristics of the Gaj peat are: pH (H_2O) 7.44, pH (KCl) 7.03, CaCO3 2.6%, humus 23.0%, Total N 0.692%, C/N proportion 19.3:1%, NH_4 -N 9.8 mg/kg, NO_3-N 108.5 mg/kg, P_2O_5 118.3 mg/100g, K_2O 6.9 mg/100g, 0.38 EC mS/cm, water soluble salts 0.12%.

The Gaj peat was enriched by cattle farmyard manure in the quantity of 10-50% and a water soluble mineral fertilizer (20:20:20 + microelements) in doses of 1.3; 1.9; 2.5; 3.1 and 3.7 g/l. There were 11 Gaj peat-based substrates prepared, and the production of basil, sage, balm, lavander, marjoram and thyme nurseries was tested on them in the *speedling* and *pot* system.

The research results have shown considerable effect of application of domestic raw material – the Gaj peat on the examined species nursery quality.

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PP-168

Anatomical investigations on *Euphorbia* species with phytotherapeutical potential

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The genus *Euphorbia* is represented by nearly thirty species in the flora of Romania, characterized by the synthesis of a white, often toxic and irritant latex. Several species have a rich ethnopharmacology, already documented since Antiquity; modern researches pointed out the potential of *Euphorbia* diterpenes in cancer treatment. Euphorbiaceae plants vegetating in Romania are largely understudied from the pharmacobotanical point of view. As a first step towards a potential valorization of indigenous species of this family, we studied the vegetative anatomy of five representatives: *Euphorbia amygdaloides, E. cyparissias* var. *vernalis, E. esula* var. *tristis*, E. *lathyris,* and *E. seguieriana* f. *major.* Roots, rhizomes and stems of these species displayed a secondary structure; the leaves are bifacial. In the case of stems, phellogen is either not yet developed at the time of flowering, or it produces only small amounts of cork and phelloderm. Innovative combinations of stains (iodine with aniline blue; malachite green with eosin) were established to improve the microscopic discrimination of histological details.

PP-169

Breaking seed dormancy of *Perovskia abrotanoides* karel, a medicinal plant of Iran

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Perovskia abrotanoides Karel., a medicinal plant, are being collected indiscriminately, thus it is an endangered species. Tetrazolium chloride test revealed that the seeds were 92 % viable. Therefore, knowledge of breaking dormancy is essential to the survival and cultivation of this species. Fifteen treatments (sulfuric acid (98 %,15 and 30 sec), sulfuric acid (75 %, 30 sec), GA_3 (1500,2000,2500 ppm, 48 h), ethephon (250, 500 ppm, 48 h), IBA (500 ppm, 15 sec and 250 ppm, 30 sec), ethanol (96 %, 24 h), 2, 4-D (250, 500 ppm, 48 h), dry heat (60 °C, 12 h) and chilling (5 °C, 7 day)) were used to break the seed dormancy of this species . Sulfuric acid (98 %, 15 sec), sulfuric acid (75 %, 30 sec), GA_3 (2500 ppm, 48 h), GA_3 (2000 ppm, 48 h), GA_3 (1500 ppm, 48 h), ethephon (250 ppm, 48 h), dry heat (60 °C, 12 h) and chilling (5 °C, 7 day) increased germination 24, 24, 47.33, 54.66, 56, 10.33, 6 and 15 %, respectively. Whereas, other treatments had no effect on germination. The treatments that broke dormancy with the greatest degree of success were GA_3 (1500-2500 ppm, 48 sec) and to a lesser degree sulfuric acid (98 %, 15 sec, 75 %, 30 sec).

PP-170

Variability of morphological characteristics in *Hypericum perforatum* l. In the Czech republic

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Hypericum perforatum was one of the species which were chosen as an object of research project studying florid meadows and possibility of its re-creation. Some plants (in vegetative form and also seeds) were transferred from 20 localities at 5 protected landscape areas around the all Czech Republic in to the field nursery in Olomouc and some morphological characteristics were evaluated. The high of plants was determined between 30 and 102 cm and width of plants between 25 and 125 cm, leaves were 0.7 – 4 cm long and 0.3 – 2.9 cm width and length of inflorescences was 10 – 61 cm. Flower diameter was determined from 1.8 to 3.9 cm. No any statistically significant differences in the plant height and width were found in the field nursery, where the plants were cultivated in identical soil and climatic conditions and where their morphology is not very influenced by environment. On the other hand in characters which are more related to genetic background – size of leaves, inflorescences and flowers - statistically significant differences were showed between individual localities and also between protected landscape areas.

PP-171

Heterosis effect in *salvia sclarea* l. (Clary sage) perspective hybrids

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For the development of *Salvia sclarea* L. new varieties with increased productivity, high quality of essential oil, wintering and drought resistance we created single, three-linear, double and stepwise hybrids. The parental forms in hybridization were used as inbred lines S_6-S_{12} of different genetic and geographic origin, single, double, backcross and stepwise hybrids F_2-F_7 (B_4-B_5) of different complexity. The created F_1 hybrids are divided into three groups due to the vegetation period: early, intermediate and late. Most of these hybrids manifest heterosis in several quantitative characters which directly influence productivity. The highest heterosis effect in relation to both the parental forms was registered by three-linear and stepwise hybrids. Thus, heterosis effect for the branching of inflorescences recorded by one of the triple hybrids is +37.8% compared to the maternal form and of +14.1% as compared to the paternal form, and the effect of heterosis on the length of the inflorescences recorded by one of the stepwise hybrids is +29.3% compared to the maternal form and of +29.5% in relation to the paternal form. The value of the new hybrids of sage created is also given by the fact that the content of essential oil in the inflorescences is over 1% (dry material). The concentration of linalyl acetate in the essential oil is also high.

PP-172

Comparative study of valuable medicinal species of *Achillea millefolium* group in Turkey and Bulgaria 3. Karyological study

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The aim of this study was to determine the taxonomic status of species originating from Turkish native flora and to confirm the species status of *A. asplenifolia* Vent. and *A. collina* J.Becker introduced to Turkey from Bulgarian flora by determining the chromosome number and plant morphology. The species *A. asplenifolia* and *A. collina* originating from Bulgaria, the commercial cultivar "Proa" and 13 populations of species collected from Bursa, Kütahya, Afyon and Van localities were investigated. The plants were cultivated in field conditions in Izmir region (2008-2009). All taxa studied have the basic number x=9, with ploidy levels ranging from 2X to 8X. The chromosome numbers of *A. asplenifolia* is 2n=18, of *A. collina* is 2n=36, and of cultivar "Proa" is 2n=36. Six populations of species collected from Turkish flora are tetraploid with 2n=36, three populations are diploid with 2n=18, three populations are hexaploid with 2n=54 (one of them being determined as *A. millefolium*) and one population is octoploid with 2n=72 (*A. pannonica*).

PP-173

Cultivation and phytochemical studies on *Ricotia carnosula* boiss. & Heldr.

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Ricotia carnosula Boiss. & Heldr. belonging to Brassicaceae family is an endemic species growing in Turkey and its natural distribution is in Antalya, Mugla and Osmaniye. Neither culture of this species nor any work on its chemical analysis has been found in the literature.

In this research, germination studies were carried out at different times on the seeds of *Ricotia carnosula* collected from Antalya for the culture. Secondary metabolites were determined by using specific chemical reactions. According to the results, germination success up to 98% was obtained with the generative production. Additionally, the 3.5 months of flowering of this species which blooms normally in March-April in the nature was achieved between December-25 and April-10. Also, it was determined that *Ricotia carnosula* had a good potential for being a winter annual plant because of its odorous, small, white flowers and natural form. So, it is possible to improve commercial varieties of this wild plant with the breeding studies. As to secondary metabolite analysis, the presence of reductor ose, saponine, flavonoid, tannin, nitrogen compounds, lipids and siyanogenetic glycosides have been identified.

Consequently, *Ricotia carnosula* has been investigated for the first time in this study and cultured successfully.

Acknowledgement

This study was carried out under the 106G020 project which is sub one of 105G068 TUBITAK-1007 roof project supported by TUBITAK – GDAR in Turkey.

PP-174

Studies on practically obtaining melon dihaploid plants for use in breeding of *Fusarium oxysporum* f. sp. *melonis* resistance

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Fusarium oxysporum f.sp. *melonis,* the factor of fusarium wilt, is a soil-borne fungi and the most important problem limiting melon (*Cucumis melo* L.) growing. Melon breeding programme of our institute has been continued with the classical methods for 25 years. The main target of this study is to improve resistant varieties and shorten breeding process via irradiated polen technique. However, haploid embryo rescue stage is the most troublesome and time-consuming process of this technique. It significantly restricts the fast and effective usage of the technique. In order to find a more practical way, 3 different embryo rescue methods (extracting seeds one by one, sowing seeds in petri dishes and inspecting seeds on the light) were compared in this study.

3-4 weekly parthenogenetic fruits obtained from three pollinations with 300 gy irradiated pollens were used. According to the results, 280 haploid embryos were acquired from 204 opened fruits and they were germinated at 96% rate. The numbers of opened fruits in a day from 3 embryo rescue methods were determined as 2.60, 6.70 and 17.33, respectively. The third method was identified as the most successful, economic, effective and the fastest method among them.

Consequently, it was proved that dihaploidization method could be included in our institute's melon breeding programme.

Acknowledgement

This study was carried out as a sub project of "F1 Vegetable Hybrid" roof project supported by SPO – GDAR of Turkey.

PP-175

An endemic species studied for the first time in regard to cultivation: *Conringia grandiflora* boiss. & Heldr.

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Conringia grandiflora Boiss.&Heldr. belongs to Brassicaceae family is an endemic species growing in Turkey and its natural distribution is in Antalya. It is an annual herbacous species and grows on rocky, limestone slopes of 300–1000 m altitudes. Blooming season of the species is March-May in the nature. Except for its taxonomy, there is no any information regarding the cultivation or phytochemical analyis of it in the literature. Germination studies were carried out at different times on the seeds of *Conringia grandiflora* collected from Antalya for the purpose of the culture in this study.

According to the results, germination success up to 98% was obtained and the winter seed sowing was found much more successfull than the summer one. It was determined that *Conringia grandiflora* had a good potential for being a late winter - spring annual plant because of its brite, charming, yellow flowers and natural form. Additionally, it was discovered that it is possible to extend flowering period and to increase the sprout number of the plants with the continuous prunings. Besides, it is also probable to improve commercial varieties of this wild plant with the breeding studies.

Consequently, *C. grandiflora* has been investigated for the first time in this study and cultured successfully.

Acknowledgement

This study was carried out under the 106G020 project which is sub one of 105G068 TUBITAK-1007 roof project supported by TUBITAK – GDAR in Turkey.

PP-176

Karyological investigation of four *Achillea* l. (Asteraceae) species growing in Turkey

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In this study, Four taxa belong to genus *Achillea* L. naturally growing in Turkey were investigated. The chromosome number and the chromosome morphology of the (*A. santolinoides* Lag. subsp. *wilhelmsii* (K. Koch.) Greuter*, A. falcata* (L) Lam., *A. magnifica* (Hub. - Mor.) *A. gypsicola* Hub.-Mor. (Boiss & Balansa) taxa were determined. The idiograms and caryograms of the chromosomes were also illustrated. The chromosome numbers of *A. santolinoides, A. falcata, A. magnifica* were observed as 2n= 18 and *A. gypsicola* 2n=36. All of the chromosomes had median point (M), median region (m), or submedian (sm) centromers.

PP-177

An investigation on the karyological features of some *achillea* l. (Asteraceae) species from Turkey

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The chromosome number and the chromosome morphology of the some *Achillea* L. species (*A. pannonica* (Scheelee), *A. crithmifolia* (Waldst. & Kit.) *A. nobilis* subsp *neilreichii* (L)) naturally growing in Turkey was investigated. Some karyological features of these species were determined and compared in point of view cytotaxonomy and karyology. The idiograms and caryograms of the chromosomes were also illustrated. The chromosome numbers of these aromatic plants were observed as 2n= 18. All of the chromosomes studied had median point (M), median region (m), or submedian (sm) centromers. The results were discussed with the genus patterns in *Achillea.*

PP-178

Morphological and growth variability of some milk thistle genotypes [*Silybum marianum* (l.) Gaertn.]

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Since that there are no official descriptors for evaluation of genetic resources of Milk Thistle [*Silybum marianum* (L.) Gaertn.], there is a strong need to develop some. Three different genotypes of Milk Thistle were grown on one site and were evaluated in 2008. 48 plants of each genotype were tested for the length of emergence period (in days), the length of the period from emergence till creation of leave rosette (in days), the length of the period from emergence till stem growth (in days), the length of the period from emergence till flowering (in days), the length of the period from emergence till fruit ripeness (in days), the number of harvested branches, the plant height in the beginning

of flowering and in the harvest time (in cm), the fruit yield of each plant (in g), the germinability (in %) of original seed and harvested seed. The data were tested by the one way analyses of variance (ANOVA). The germinability of original seed ranged from 87 – 93 % after 7 days and from 88 – 98 % after 14 days. The germinating ability of harvested seed was evaluated 14 days after the harvest; it was low and indicated the various level of the dormancy which was not studied yet. The values ranged from 19 – 25.3 % after 7 days and from 39 – 59.3 % after 14 days. The results showed statistically significant differences between the mean values for the height of the plants in the beginning of the flowering (67.1 – 91.0 cm), in the harvest period (90.8 – 120.2 cm) and in the number of harvested branches (11 – 28). The highest number of harvested branches resulted in the highest yield of the fruits (the range was 16.84 – 36.12 g *per* plant).

PP-179

Determination of insect bio-diversity of anise (*Pimpinella anisum* l.), Coriander (*Coriandrum sativum* l.) And fennel (*Foeniculum vulgare* mill.) In burdur province in Turkey

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This study was carried out between April and September in 2009 when the insect abundance is highest for determination of insect bio-diversity in the important medicinal and aromatic plants; anise (*Pimpinella anisum*), coriander (*Coriandrum sativum*) and fennel (*Foeniculum vulgare*) where there were no pesticide application and used periodicity rotation in Burdur province. Bio-diversity index were measured by Shannon-Wiener and Simpson diversity, Simpson dominancy, Shannon Evenness with individuals of insect species sampled by pitfall traps. Hence bio-diversity was measured the highest in other agro-ecosystems with both Shannon-Wiener and Simpson diversity in fennel as 2.5838 and 0.8742, respectively. According to Simpson dominancy parameters' result, coriander field was found more dominant habitat than anise and fennel agro-ecosystems with 0.2025. Result of Shannon Evenness showed that anise plantation has the highest evenness with 0.7333. According to this study results, bio-diversity indexes calculated from agro-ecosystems where there were no pesticide application and used periodicity rotation similar with agricultural areas managed by organic farming methods.

PP-180

Management of agronomy factors and their roles on control of climatic stress in saffron *(Crocus sativus l.)*

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Saffron (*Crocus sativus* L.) has many applications in food industry, cosmetic, medicine, dye, perfumery and art. Also, it is the most expensive product of agriculture. Iran has produce 60% of saffron and it is the biggest producer and exporter of saffron by doing of 90% of saffron exporting on the world. There was no considerable change on saffron cultivation in Spain and Iran. Average yield of saffron is 4.7 kg *per* hectare in Iran. This investigation has been done according to recent research results on saffron field management to decrease effect of chilling temperatures lower than -20°c on saffron yield such as freezing period that had been experienced in Iran in 2008. A questionnaire had been designed on the basis of new methods of saffron field management to determine effective factors which decrease negative effect of freezing period on saffron yield. Correlation coefficients showed role of each factors on decrease of chilling effect. Stepwise regression showed that depth of corm planting, date of last irrigation, age of field, manure application and nitrogen fertilizer had negative effect on rate of decrease of saffron production due to freezing period, except field age, respectively. Effect of first three traits was significant at 5 % level. Finally, 30 % of yield variations caused by chilling temperature are manageable by these factors.

PP-181

Effect of different fertilization management on saffron *(crocus sativus l.)* Yield

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Saffron (*Crocus sativus* L.) has many applications in food industry, cosmetic, medicine, dye, perfumery and art. Also, it is the most expensive product of agriculture. Iran has produce 60% of saffron and it is the biggest producer and exporter of saffron by doing of 90% of saffron exporting on the world. There was no considerable change on saffron cultivation in Spain and Iran. Average yield of saffron is 4.7 kg per hectare in Iran. This experiment had been done to identify the best fertilization management for saffron fields in Torbat-e Jam, Iran according to the soil test of the region in complete randomized block design with three replications. Treatments (T1:Control, T2:Manure fertilizer (40 t/ha.), T3: NPK (20, 20, 20) plus mineral materials except iron in early March, T4: NPK (12, 6, 40) plus mineral materials except iron in early March, T5: NPK (20, 20, 20) plus mineral materials except iron in early March and late March, T6: NPK (12, 6, 40) plus mineral materials except iron in early March and mid March, T7: NPK (20, 20, 20) plus mineral materials except iron in early March, mid March and late March, and T8: NPK (12, 6, 40) plus mineral materials except iron in early March, mid March and late March) were applied on 3 years old saffron filed in Torbat-e Jam that experienced chilling temperatures in 2008. There were significant differences among treatments for saffron flower weight and saffron product traits. T8, T7 and T6 treatments were the best treatment and T3, T4 and T1 were the worst ones. So, application 3 times of NPK plus mineral materials in early March, mid March and late March is advisable for that region.

PP-182

Cultivation of rosemary (*Rosmarinus officinalis* l.) Of eastern mediterranean region of Turkey

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Rosemary (*Rosmarinus officinalis* L.) is a medicinal and aromatic plant which is used widely in foods, perfumes, cosmetics and medicinal preparations. It is especially a natural antioxidant source for food sector. Carnosic acid in rosemary is an important phenolic diterpen and has utility as an antioxidant. Rosemary has several varieties which vary in their leaf yield and essential oil content. Since 2004 Eastern Mediterranean Forestry Research Institute has studied on cultivation of rosemary (*Rosmarinus officinalis* L.) varieties which have a large population in Eastern Mediterranean Region of Turkey. In this research, we investigated 50 varieties of the rosemary which have different leaf yield and essential oil content. Trial areas were established at three different altitudes according to randomized complete block design with 3 replications. Trial areas were observed throughout 3 years and harvested in October and November months. According to three years averages of trial areas, it was determined the rosemary varieties which are valuable for cultivation in terms of dry leaf yield and essential oil content. Besides it was analyzed carnosic acid contents of some the rosemary varieties.

In terms of varieties' dry leaf yields and essential oil contents, it has been determined the highest dry leaf yield with 449,11 kg/da (essential oil content of the variety; %2,5) and the highest essential oil content with %4,4 (dry leaf yield of the variety; 414,97 kg/da) at Karabucak trial area irrigated three times throughout summer months. In terms of varieties' carnosic acid contents, it has been determined the highest proportion with %5,31 (dry leaf yield and essential oil content of the variety; 414,97 kg/da and %4,4).

PP-183

Some quality characteristics of the reconstituted instant sage (*salvia fruticosa*)

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Present work describes for the first time some quality characteristics of the reconstituted instant sage processed from *Salvia fruticosa*. The water extract of the plant was spray-dried at 145°C, 155°C, and 165°C, respectively, by using different food hydrocolloids viz. β-cyclodextrin, arabic gum, and maltodextrin as carrier materials at different concentrations (3 and 5% w/v). Color (Hunter *L, a, b*), turbidity (Nephelometric Turbidity Unit, NTU), phenolic content (gallic acid equivalent in g/100 g dry matter*)*, total antioxidant activity (μmol Trolox equivalent/g dry matter by ABTS radical decolorization assay), major volatile (1,8-cineole by head-space sampling and gas chromatography), and sensory analyses were performed on the reconstituted instant sage samples, prepared according to the preferential consumer concentration (0.4 g instant powder/100 mL boiled water). The results showed that both drying condition and different carrier application significantly (*P<0.05*) affected the qualitative properties and the sensorial acceptance of the reconstituted instant sage. 155°C was somewhat critical point as almost all significant changes were observed below or above this temperature. β-cyclodextrin was found to be the most effective carrier to decrease 1,8-cineole losses during spray drying. Moreover, starch derivatives provided better color and NTU turbidity values. Although the inlet air temperature had no significant influence on the total phenolics of the samples, it caused remarkable changes in the antioxidant activity. Instant sage had generally consumable quality; even they were more liked comparatively to that one, prepared directly from the plant.

PP-184

Study of morphological, oil composition and cytological variation in genotypes of *Matricaria recutita*

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This experiment was carried out to evaluate agronomic, oil composition and cytogenetics variation in collected populations from different regions of Iran. Fifteen populations of *Matricaria recutita* were planted in randomized complete block design with three replications in 2007-2008. During two years, agronomic, phenologic traits and essential oil were measured. The oil composition were identified by gas chromatography and comparing their retention index with these of authentic samples and published data. Chromosome counts were conducted by aceto-iron-hematoxylin stain. Analysis of variance indicated highly significant differences for all of agronomic and phonologic traits except for number of white ray florets and 1000- weight seed. The highest number of flower per plant among populations belonged to Esfahan population with 45.69 flower *per* plant. Data also showed that number of tiller per plant, number lateral brunch of flowering, wet and dry weight *per* plant and essential oil in Esfahan population is more than other populations. Cluster analysis on the basis of seven composition oil, classified populations in four groups. Result of analysis of composition oil showed four different chemotypes which characterized by a high contribution of their compound and named α-bisabolol oxide A and B chemotypes, farnessene chemotype and β-bisabolol in studied populations. Chamazulene varied between 0.84 in Majarestan population to 15.9 percent in Ardabil population. Karyological analysis showed diploid and tetraploid levels among evaluated populations. The base number was x=9 among two level ploidy. Assessment of accessions by karyotype symmetry showed that tweleve populations placed in 2A class, two populations in 1A class and one population in 2B class. Two populations from Ahvaz and Dazful had the highest symmetry and Ardebil population had the highest asymmetry among karyotype populations.

PP-185

Poppy cultivation in the Czech Republic and Slovak Republic

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Poppy (*Papaver somniferum* L.) is a traditional crop in the Czech Republic and Slovak Republic. Its cultivation has a long-standing history. In the Czech Republic poppy production is supported by Law 167/1998 concerning the habit substances. Poppy cultivation

in large areas with over 100 m^2 is possible when based on a report which is given to a customs officer. All controls are secured by the Czech Customs Authority, Police and Ministry of Health. However, in the Slovak Republic the recent conditions of poppy cultivation were modified by Law 139/1998 concerning narcotic and psychotropic components and products. This rule makes it possible for the cultivation of poppies on land of more than 100 m^2 based on permission from the Slovak Ministry of Health. In both these countries farmers prefer a combination method of poppy production: seeds for food purposes and dry capsules for pharmaceutical industry. During the last 10 years poppy production areas in the Czech Republic from 27,611 to 69,793 ha, showed an average yield of poppy seeds from 0.46 $t.ha^{-1}$ to 0.90 $t.ha^{-1}$ while in the Slovak Republic production areas were from 386 to 2,714 ha and yielded seeds usually from 0.28 to 0.73 $t.ha^{-1}$. Good agricultural practice and original Slovak poppy varieties provide a suitable background for a high yield potential of seeds (about 2 $t.ha^{-1}$). Poppy capsules, as a secondary product, are an important raw-material to pharmaceutical industry - company Zentiva, Co. in Hlohovec, Slovakia. Capsule yields fluctuate according to the season and customer requests from 300 to 500 $kg.ha^{-1}$. Poppy straw exported from the Czech Republic to the Slovak company Zentiva is in quantity from 838.8 to 6,735 tons per year (from 1990 till 2006 year). In comparison production of poppy straw for the Zentiva Company from Slovak farmers were from 55.3 to 1,191.5 tons per year (during years 1990 and 2006). The cultivated varieties of poppy can accumulate from 0.4 to 0.6 % of morphine. However, based on statistics from 1970 to 2005 years, the imported straw material contains only 0.3 % of morphine in average, which could be caused by the seasonal changes and collection practices.

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PP-186

Exploitation of *Vaccinium myrtillus* l. In np kopaonik in Serbia

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Vaccinium myrtillus L. (blueberry) is one of the most frequent and abundant vascular plant species in Europe. Blueberry is widely collected for both household consumption and sale. The picking of this species is of great economic significance to many mountainous regions in Serbia due to poorness of local population. In that situation blueberry is under continuous pressure of oversize and irregular exploitation.

In this paper, we explored how local people collect *Vaccinium myrtillus* within NP Kopaonik which is situated in central part of Serbia.

The findings indicate that exploitation of species *Vaccinium myrtillus* is unsustainable in investigated region. Namely, for blueberry fruits collection the harvesters use mechanical tools which are forbade by low. Using these tools can cause damage of individual and endanger of population. Moreover, many harvesters start with collection too early. These are the main reasons of particular situations in which local people and National Park's administration are in conflict for the access and the control of *Vaccinium myrtillus* populations. The results show the need to implement educational programs on sustainable collection of blueberry.

PP-187

Morphological diversity of *Capparis spinosa* l. In jordan

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Collection of plant material was made from twenty four populations of *Capparis spinosa* that cover different geographical regions (North, Center, and South) of Jordan. Morphological characteristics of plants were measured and compared by analysis of variance and multivariate analysis methods. Analysis of variance showed that all of the characters in the examined ecotypes were significantly different (except plant width), showing high variability. Results showed that the differences noted in morphological characters in *C. spinosa* populations may be attributed to both genetical and environmental variations. Principal Component analysis reduced the original twelve morphological characters to five principal components. It was showed that the first five principal components explained 71.5% of the total variation, with number of the first order branch, branch length, diameter of first order branch, plant height and internode length being the most important characters in the first principal component. Cluster analysis grouped the accessions into six main clusters based on unweighted pair-group average linkage (UPGMA) method. The phenotypic diversity of *C. spinosa* in Jordan was found to be high, which indicated their potential importance for future breeding programs.

PP-188

The effects of salinity and drought stresses on germination and seedling growth of clary (*Salvia sclarea*)

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In order to investigate the effects of drought caused by PEG 6000 and salinity induced by NaCl on germination and seedling growth of Clary, two experiments were carried out based on a completely randomized design with 4 replications. In the first experiment, the effects of drought levels (0, -2, -4, -6, -8, -10, -12 bar) and in the second one the effects of salinity levels (0, 50, 100, 150, 200, 250, 300, 350 mmol) on germination percentage, germination rate, seedling length and seedling dry weight was studied. Effect of salinity and drought stresses were significantly different between various treatments. The maximum rates and percentage of germination were obtained at control treatment and the minimum percentage of germination was obtained at -12 bars and 350 mmol. Water potential significantly reduced seedling length and seedling dry weight. Results showed that clary, a medicinal plant, is highly tolerant to drought and salinity stresses during germination period.

PP-189

Effects of biofertilizers on quantitative and qualitative yield of chamomile (*Matricaria recutita*) as a medicinal plant

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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. Chamomile is one of the oldest medicinal plants that have been using by human since ancient time. In order to study the effect of biofertilizers on quantity and quality yield of Chamomile, an experiment was conducted at Research Station, College of Agriculture, Ferdowsi University of Mashhad, Iran, in year 2008. A complete randomize block design with three replications was used. The treatments were: nitroxin biofertilizer (*Azotobacter sp* + *Azospirillum sp*), phosphate suloblizing bacteria and nitroxin biofertilizer + phosphate suloblizing bacteria. Result showed that these treatments had significant effects on main shoot, number of flower per plant, diameter of flower, fresh flower yield, dry flower yield, seed yield, essential oil and chamazulene yield. The highest fresh and dry flower yield was observed in nitroxin and phosphate suloblizing bacteria. The highest essential oil and chamazulene yield *per* hectare were obtained in phosphate suloblizing bacteria (8600g) and nitroxin (923g) treatments, respectively. Moreover, the lowest fresh and dry flower yield, essential oil and chamazulene yield *per* hectare related to the nitroxin biofertilizer + phosphate suloblizig bacteria treatment. It seems that biofertilizers can consider as a replacement for chemical fertilizers in chamomile medicinal plant production.

PP-190

Effect of harvesting date on quantitative and qualitative characteristics of seedless barberry (*Berberis vulgaris*) fruit

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Seedless Barberry (*Berberis vulgaris*) is one of the endemic and valuable shrubs that grow as a garden crop only in Iran. In order to study the effect of different harvesting dates (9 September, 1 October, 22 October and 12 November) on quantitative and qualitative characteristics of seedless Barberry, an experiment was carried out based on Complete Randomized Block Design with 3 replications at the Southern Khorasan province in 2008. Results showed that different harvesting dates had a significant effect on fresh fruit yield with branch, fresh fruit yield without branch, branch fresh weight, dry fruit yield, 100 fresh fruit weight, 100 dry fruit weight, pH, brix, acidity and anthocyanin indexes. The highest and the lowest fresh and dry fruit yield were obtained at final harvesting date (12 November). Moreover, with delaying in harvesting date the brix, pH and anthocyanin indexes were increased but acidity was decreased. The result of correlation coefficient showed that there was a positive correlation between pH and soluble solids content in extract. But correlation coefficient between pH and acidity was negative. Furthermore, correlation of anthocyanin with brix and pH was positive and its correlation with acidity was negative. Our results showed that the best harvesting date was 12 November that improved qualitative and quantitative indexes of seedless barberry for the studied region.

PP-191

Variability of morphological characteristics in *Agrimonia eupatoria* l. In the czech republic

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Agrimony (*Agrimonia eupatoria* L.) is one of the medicinal plants, which are perspective for recultivation of flowering meadows in the area of the Czech Republic. Detail knowledge about each used genus is necessary before the producing of seed mixtures for such recultivation. The variability of morphological characters was studied as a first step of agrimony cognition. Ten particular Czech populations of this genus were studied in the field nursery and even after 2 years of cultivation in identical conditions there were found statistically significant differences in morphological characters. 281 plants were studied in total and high of plants was determined between 37 and 175 cm. Width of plants achieved between 13 and 122 cm, leaves were 6 – 37 cm long and 4 – 20 cm width. Length of inflorescences was measured between 8 and 116 cm.

PP-192

Changes in essential oil content of dill (*Anethum graveolens* l.) Organs in response to water deficit

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Although the secondary metabolite production is believed to be stimulated by stressful environment, there is too little experimental data to support this notion. Therefore, two experiments were conducted in 2006 and 2007 at the Research Farm of the University of Zanjan, Iran, to evaluate the effects of water deficit during vegetative and reproductive stages on essential oil content of dill organs. The experiments were arranged as split-plot, based on randomized complete block design with four replications. Irrigation treatments and plant organs (leaves, flowers and seeds) were assigned to the main and sub-plots, respectively. The essential oil of the plant organs were separately isolated by hydro distillation. The results of combined analysis of variance indicated that the percentage and yield of essential oil were significantly ($P \leq 0.01$) affected by water stress and harvested organs. The essential oil content of seeds and flowers was much higher than that of leaves under all irrigation treatments. The essential oil percentage of dill flowers and seeds was increased with decreasing water availability. However, the highest essential oil yield *per* unit area was obtained under moderate water stress. Thus, essential oil yield of dill could be improved by a moderate water stress during reproductive stages.

PP-193

Effect of nitrogen rates on qualitative traits and seed yield of fennel (*Foeniculum vulgare* mill.) Accession

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Nitrogen fertilization affects plant genotypes differently; therefore this experiment was conducted to determine the effect of nitrogen rates on fennel, a medicinal plant, quality and quantity. Five nitrogen rates (0, 40, 80, 120 and 160 Kg/ha N) were used to determine their effects on four fennel accessions (Esfahan, Tehran, Yazd and 11486). The experimental design was split plot with nitrogen rate as main and accession as sub plots and replicated three times and conducted in Esfahan University of technology Experimental Station in 2008-2009. Ash and dry matter contents and seed yield were different among the accession, while nitrogen rates had different affect on seed protein, fiber, and ash contents and yield. There was significant interaction between the accession and nitrogen rate on seed protein, ash and dry matter contents. Tehran accession and 160 Kg/ ha N produced the highest seed yield per plant. The highest protein, fiber and ash contents were produced by 120, 160 and 0 kg/ha N, respectively. The results showed that accessions responded differently to N fertilization rates, thus selection among the accession and N rate is possible.

PP-194

Determination of summer snowflake (*Leucojum aestivum L.*) On turkey's flora

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Leucojum is a genus in the the Amaryllidaceae. Leucojum is represented by "L. aestivum subsp. pulchellum" in Turkey. About 20 alkaloids have been isolated from L. aestivum. Leucojum aestivum (summer snowflake) is a plant species used for the extraction of galanthamine, an acetylcholinesterase inhibitor for the treatment of Alzheimer's disease. summer snowflake has economic importance for our country as an important medicinal and ornamental plant species. Summer snowflake has been collected excessively from natural occurring areas and the natural populations have been damaged. Its natural population should be protected.

PP-195

Effect of salicylic acid on milk thistle development, seed yield and silymarin content

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An important consideration for milk thistle (*Silybum marianum* L.) cultivation is regulating development to lengthen the reproductive stage and increase seed yield with high silymarin content. The treatment of milk thistle with different concentrations of salicylic acid (0, 10^{-2}, 10^{-4} and 10^{-6} M) showed increase in the proportion of mature flower heads. Highest seed yield, chlorophyll content, photosynthesis, water use efficiency, mesophyl efficiency and highest content of silymarin was found in plants treated with 10^{-6} salicylic acid, whereas in plants treated with high concentrations of SA the total amount of silymarin and seed yield *per* hectare were decreased.

PP-196

Effects of gibberellic acid, kinetin, iron and zinc on *Nigella sativa* l.

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A field experiment was carried out in the Experimental Farm of Persian Gulf University. The aim was to study the effects of GA_3 (100 ppm), kin (50 ppm), Fe (100 ppm) and Zn (100 ppm) on vegetative and reproductive characteristic in order to define the optimum treatment for best yields of *Nigella sativa*, L. seeds and oil. Kinetin increased number of branches and capsules per plant, seed yield as well as fixed and volatile oil yields. Chlorophylls in leaves were not affected by any of used growth regulators. The results showed that GA_3 increased number of seeds per capsule, fresh and dry weights of herb, plant height, seed yield as well as fixed and volatile oil yields. application Fe + Zn increased fresh and dry weights of herb, capsule number, seed yield, number of branches, fixed and volatile oil yields. Zn treatment alone was not effective. Gibberellic acid combined with either Zn or Fe+Zn resulted in the maximum values of plant height as well as fresh and dry weights of herb. Meanwhile, BA combined with Fe+Zn increased number of capsules, seed yield, fixed and volatile oil yields.

PP-197

The protection of medicinal and aromatic forest plants from the defoliating insects based on the principles of the organic production

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The Serbian forests are resources of numerous products, partly quantified and valorized. The complex, frequently complementary use of as much as possible products of forest ecosystems is of permanent importance. Along with timber, the main product, the most important in the commercial sense recently have been forest fruits and aromatic plants, in which Serbia is abundant, due to favorable site conditions. People have harvested and processed forest plants for medicinal purposes since the beginning of history. Forestry in Serbia intends to enrich 500,000 ha of degraded forests by these valuable plants. Since these species are hosts of numerous, omnipresent, economically harmful insects, in the harmony with trend of forest protection and guidelines to organic products, Institute of Forestry in Belgrade have been studied the biological efficiency of insecticide based on bacterium *Bacillus thuringiensis* ssp. *kurstaki*, aimed at control of the most significant outbreaking defoliating species from Lepidoptera order, which during the increased multi-annual abundance hinder the collection of medicinal and aromatic forest plants, for almost two decades. Results of these studies are very good, and application of this type of protection ensures that medicinal and aromatic plants from natural forest ecosystems do not contain dangerous substances from applied measures.

PP-198

Metal uptake by saint john's worth (*Hypericum perforatum* l.) Grown on industrially polluted soil

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Possibilities for phytoaccumulation of heavy metals, antioxidant capacity, essential oil quality and quantity of Saint John›s worth (*Hypericum perforatum* L.), grown on industrially polluted with Cd, Pb and Zn soil were studied. Content of Cd, Pb Zn in the polluted soil exceeded permissible concentrations 3, 4 and 2 times respectively. Saint John's worth plants were grown under glasshouse conditions on polluted and non-polluted control soils. Saint John's worth possessed high potential for phytoaccumulation of Cd and Pb, because its contents in the shoots were 66 times and 11.9 times more than the in the control respectively. Soil pollution with Cd, Pb and Zn did not cause oxidative stress response in the plants because the main antioxidants (ascorbate, gluthatione, vitamin E and hypericin) did not increase. Essential oil yield and quality of *Hypericum perforatum* L. was not influenced by the increased content of Cd, Pb and Zn in the soil.

PP-199

The histochemical analysis of *thymus lykae* deg. Et jav. Glandular trichomes

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The genus *Thymus* L. belongs to the family Lamiaceae, and comprises numerous aromatic species which are used for medical purposes and also as culinary herbs. *Thymus lykae* Deg. et Jav. is an endemic, aromatic species from central Balkan which grows on serpentine hills, spreaded on dry, rocky, sunny hillsides, from the lowland to the mountains.

Histochemical analyses of the peltate and capitate trichomes of *Thymus lykae* were carried out using light microscopy. On the cross sections of fresh leaves the big secretory drops in large subcuticular spaces of peltate trichomes were noticed. Results of histochemical tests showed positive reaction to phenolic and tanin compounds in secretory heads of both type of glandular trichomes. Reaction for lipids was positive in subcuticular spaces of peltate and in stalk cells of capitate trichomes, while the strong positive reaction for acid lipids was observed in the heads of capitate trichomes. Intensive positive reaction for pectine was obtained in the secretory head of peltate trichomes, while positive reaction for polysaccharides was observed in both types of glandular trichomes. In both peltate and capitate glandular trichomes the negative reaction for proteins was obtained. Data from histochemical tests revealed that the secreted material in the glandular trichomes of *Thymus lykae* is of heterogeneous composition.

PP-200

Hyssopus officinalis l. – Medicinal or melliferous plant?

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In order to perceive the quality of hyssop as a kind of honey plant, and going by the fact that it is acknowledged to be a good medicinal plant, investigation aimed at to estimate its melliferous potential and significance for bee pasture. Precise assessment of melliferousness included quantitative-qualitative analysis of floral nectar production in the given agroecological conditions, data on plant floral productivity, number and coverage of population and length of flowering phenophase. Research also included morphological flower characteristics and observation of frequency of honey bee visits during flowering phenophase. Total daily nectar amount (0.4 ml/flower), and the model of the diurnal dynamics of nectar secretion with two peaks was established. Hyssop was continuously visited during the day with (average rate 30.28 bees/10 min). The percentage of visited flowers in the ten-minute period was 1.476 %. Given the total daily volume of nectar per flower and per plant, and considering the number of seedlings per hectare, and length of flowering, honey yield per hectare/per season was estimated. Due to all analyzed flower characteristics and observation of pollination behavior and visits, *H. officinalis* can be considered as significant source of pollen and nectar for honey bees as the most effective pollinator.

PP-201

The quantitative effects of temperature and light intensity on growth of st. John's wort (*Hypericum perforatum* l.)

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In this study, it was aimed to define the relationships between temperature, light intensity and growth parameters for St. John's wort (*Hypericum perforatum L.*) namely net assimilation rate, relative growth rate, leaf weight ratio, leaf area ratio and specific leaf area. Changes in plant growth caused by the effects of environmental conditions such as temperature and light intensity were intended to be described by plant growth models. All equations produced for growth parameters were derived as affected by light intensity and/or temperature. As a result of multi-regression analysis, it was found that there was close relationship between actual and predicted growth parameters. The regression coefficients (R^2) of the produced equations for growth parameters changed from R^2=0.92 (leaf weight ratio) to R^2=0.97 (leaf area ratio).

PP-202

Quantitative-qualitative properties of milk thistle (*Silybum marianum* /L./ Gaertn.) cultivated in sustainable agricultural system

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A polyfactorial field experiment was established and investigated during vegetation periods from 2006 to 2009 at the Dolná Malanta locality (Nitra district, Slovakia). The following parameters were measured: (1) yields of milk thistle (*Silybum marianum* [L.] Gaertn.)

achenes, i.e. fruits, in 2006–2009; (2) content of silymarin in dry fruits of milk thistle in 2006–2009; and (3) total yields of silymarin per ha in 2006–2009. Factors of the experiment were as follows: (1) crop residues of cultivated pre-crop (no crop residues – K, with crop residues – R); (2) cultivation of freezing-out intercrop (no intercrop – B, with intercrop – M); (3) fertilization using artificial fertilizers (no fertilization – O, with fertilization – F); (4) year of cultivation (2006–2009). The highest yields of milk thistle fruits were recorded in 2006: from 1,426.5 $kg.ha^{-1}$ (RBO variant – incorporated crop residues without intercrop, no artificial fertilizers) to 1,832.0 $kg.ha^{-1}$ (KBF variant – without crop residues, without intercrop and with application of artificial fertilizers). The highest content of silymarin complex in dry fruits of milk thistle was measured in 2007: from 15.14 $mg.kg^{-1}$ (RMF – with crop residues, intercrop and fertilization) to 20.01 $mg.kg^{-1}$ (KBO – without crop residues, intercrop and fertilization). The highest total yield of silymarin per ha was recorded in investigated variants in 2006; in variant without crop residues it ranged from 16.45 $kg.ha^{-1}$ (KMF – with intercrop, with fertilizers) to 24.62 $kg.ha^{-1}$ (KMO – with intercrop, no fertilization).

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PP-203

New legislation conditions of poppy (*Papaver somniferum* L.) production in Slovak Republic

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Opium p in different agro-climatic conditions all over the world, from the equatorial zones to the north: via India, Central Europe to Scandinavia and the southern parts of England. Worldwide, the opium poppy is used mainly in food and pharmaceutical industries. Production and trade of poppy is subject to international control, under the agreement signed in 1961, which was ratified by more than 60 countries. Legal poppy cultivation is subject to many international agreements and strict control under the International Narcotics Control Commission of the UN. Poppy for food industry is grown mainly in Central Europe. Most European countries have already adopted restrictions for poppy growing because of possible misuse of the plants to produce drugs. Poppy cultivation in Slovakia has a long tradition. It is cultivation of traditional varieties, which are mostly grown in gardens in rural areas of Slovakia as well as larger scaled cultivation of registered varieties in the catalog of varieties of agricultural plant species (field crops), with 47 listed varieties of poppy.

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PP-204

Effect of water stress and foliar application of micronutrients on isabgol (*Plantago ovata*) yield

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Isabgol (*Plantago ovata*) is an important medicinal plant that its seed husk has medical value in treating intestinal disorders. Crop production in arid and semiarid environments is a highly unstable and unsustainable due to inhospitable climate and poor soil fertility status. In order to study the effect of micronutrients foliar application under water stress conditions an experiment was conducted at Zabol University in 2007. Experimental design was split plot based on randomized complete block with 4 replications. Irrigation levels (control, no irrigation in anthesis and no irrigation in seed filling stage) were as main plot and foliar application levels (control, Fe, Zn, Mn and Fe+Zn+Mn) were as sub plot. The effect of water stress on seed yield and its component was significant. The control (non stress) treatment had the highest seed yield (610.8 $kg.ha^{-1}$), 1000 seed weight (1.82 g), seed number per spike (81.69) and number of spike per plant (26.63). These traits were not significantly different between two water stress treatments. Seed yield and its components (except spike number per plant) were affected significantly by foliar application treatments. The control (non fertilizer) treatment had the lowest seed yield and components. Seed yield and 1000 seed weight were not significantly different between other fertilizing treatments. Harvest index was not significantly affected by water stress and foliar application treatments. In conclusion, it seems that isabgol has a good response to micronutrient foliar application both under stress and non stress conditions.

PP-205

The influence of time of harvest on essential oil yield and composition of *Agastache foeniculum*

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The essential oils content and composition in plants can be affected in a number of ways, from their formation in the plant to their final isolation. The time of harvest during year can be a determinant for the essential oil content and composition of plants. A field experiment was carried out during 2008 at the Tarbiat Modares University. We investigated effects of three time of harvest on essential oil content and constituents of Agastache *foeniculum*. The result of hydro distillation of the dry herb showed that first harvest showed the highest essential oil content (1.84), then at the second and third harvests, the amount of essential oil decreased but there was not significant difference between three harvests. According to the GC and GC-MS analyses, it can be concluded that the amount of methyl chavicol declines with the time of harvest from 97.79 at first harvest to 96.49 at third harvest while the levels of the limonene increases.

PP-206

Sex identification of jojoba female and male juvenile plants by molecular markers

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Jojoba is a dioecious plant that may be propagated by direct seeding, in which case about half of the seedlings are males. Therefore it is essential for economic cultivation and successful breeding programs to establish reliable molecular markers for sex identification at an early developmental stage. Polymerase chain reaction (PCR)-based assays were utilized to detect differences between male and female plants. Our results established a PCR-based diagnosis of juvenile jojoba plants sex, and identified male- and female-specific molecular markers. Moreover, experiments are in progress to establish accurate one step-one primer PCR based reaction assays, which may provide a simple and speedy screen of samples.

PP-207

The macro- and microscopic pharmacognostic study of some *Chamomillae flos* samples comercialized in romanian pharmacies

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As part of a wider research on the pharmaceutical quality of 9 samples of chamomile marketed by Romanian pharmacies, in addition to the phytochemical study undertaken a macro-and microscopic pharmacognostic analysis was performed using a control purchased from Sidroga (Germany) company. The pharmacognostic study was conducted in accordance with the requirements of the European Pharmacopoea, looking for the presence or the absence of some macroscopic elements, color, smell, taste and possible mineral or other type of impurities. In the microscopic study, we sought the presence, in the powdered drug, of different features such as: glandular trichomes on bracts and floral elements, the presence of epidermis with folded cuticle or papilla, small calcium oxalate Druse and characteristic pollen grains. For almost all samples, except the control Sidroga, we identified the presence of other parts than the inflorescence and also the contamination with *Achillea millefolii*, *Capsella bursa pastoris*, *Alium cepa*, grass etc., as well as feathers and hair, animal organic residues, insects. At the same time, the microscopic analysis reavealed that all 9 samples contained impurifications, especially in the form of surface trichomes of *Malvaceae*.

PP-208

Effect of drought stress and different fertilizers on some physiological aspects in chamomile

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In order to study the effects of water stress and three kind of fertilizers on physiological parameters (Ch a, Ch b, proline and carbohydrates concentration) and sodium and potassium concentration in Chamomile (*Matricaria chamomoilla* L.) a field experiment was laid out in randomized complete block design in split plot arrangement with three replications in 2008 at university of Zabol. Drought treatments included 90% FC or non stress (W_1), 70% FC (W_2) and 50% FC (W_3) as main plot and fertilizer treatments included non fertilizer (F_1), chemical fertilizer (F_2), manure (F_3) and compost (F_4) as sub plot. Results showed that water stress at W_3 treatment, reduced dry flower yield about 18.1%. In this study, however the highest flower yield was obtained from W_1 and use of chemical fertilizer treatments but at W_3 treatment, among the fertilizer, manure had the best effect on flower yield in Chamomile. Water stress increased percentage and yield of Essential oil but the highest of that was obtained in W_2 and use of chemical fertilizer. In this experiment, Chlorophyll a, b and K^+ contents in leaves decreased by impact of water stress but free proline, total soluble carbohydrate concentration and Na^+ were increased under water stress. Use of manure fertilizer had the highest positive effects on physiological parameters and potassium uptake under water stress condition in chamomile.

PP-209

Effect of fertilizer type and interval of irrigation on quality and quantity criteria of lavander (*Lavandula angustifolia*), rosemary (*Rosemarinus officinalis*) and hyssop (*Hyssopus officinalis*)

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In order to investigate of effect of fertilizer types and irrigation regimes on quantity and quality criteria of three medicinal plants: Lavander, Rosemary and Hyssop, an experiment was conducted at Research Field of Faculty of Agriculture, Ferdowsi University of Mashhad, Iran, during two growing years of 2007-2009. A split plot design with three replications was used. Treatments were three irrigation intervals (10, 20, 30 days) as main plots and three types of fertilizers: control, Nitroxin (5lit/ha), nitrogen fertilizer (50 and 100 (kg/ha), cow manure (10 and 20(ton/ha)) as subplots. Animal manure and chemical fertilizer were applied at the time of transferring seedlings to the field and Nitroxin was used with the first irrigation. Shoot harvesting was performed twice during the plant growth at the time of full flowering. Increasing interval of irrigation reduced dry matter yield of three species and the highest yield of Lavander(6250kg/ha), Rosemary(3508kg/ha) and Hyssop(7380kg/ha) were obtained with 10 days interval. Also the effect of fertilizer was not significant but the highest yield for lavender (3930kg/ha), Rosemary (2535kg/ha) was obtained with 50 kg/ha chemical fertilizer and the highest yield of hyssop (6115kg/ha) was recorded with application of 20 ton/ha animal manure. The highest essential oil content was from Lavander (1.5%) but the highest yield of essential oil was obtained from three species, Lavander (72kg/ha), Rosemary (45kg/ha) and Hyssop(48kg/ha) with application of biological fertilizer. The ratio of leaf dry weight to stem dry weight for both years was gained with 20 days irrigation interval at 10 ton/ha animal manure.

PP-210

The effects of varying nitrogen and phosphorus doses on seed mineral composition of black cumin (*Nigella sativa* l.)

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Scientific studies declare that tolerable and sufficient mineral content and composition of the crops are desired in genuine diets. Macro and micro mineral contents of the crops are affected

by plant genetic structure, soil characteristics and applied plant nutrients as chemical fertilizers. In this mean, the goal of the study was to determine the effects of varying nitrogen and phosphorus doses on seed mineral content of black cumin. Field trials were realized at experimental area of Yuzuncu Yıl University, Agricultural Faculty, Field Crops Department in the year 2007. Five nitrogen (0, 20, 40, 60 and 80 kg/ha) and three phosphorus (0, 20 and 40 kg/ha) doses were applied to the plots. In laboratory analyses, N, P, K, Mg, Ca, Fe, Cu, Mn and Zn content of black cumin seeds were investigated. In conclusion, all the investigated mineral contents of the seeds were significantly affected by varying nitrogen doses except for Mg and Ca. Different phosphorus doses affected P, Mg, Ca and Mn content of the seeds.

PP-211

Evaluation water stress and phosphorous on qualitive and phonological traits of nigella sativa

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Black seed with the scientific name *Nigella sativa* and gramineous plant is native to Western Asia. Since treatments role in crop growth and yield and quality of medicinal plants are active ingredients for this purpose effects of different levels of moisture stress and phosphorus on some properties and performance of some Sativa plants, experimental crops in 87 field research was carried out Sepahan Isfahan view. Experiment had a split plot design by randomized complete block with 3 replications was carried out. Assembly of three levels of review dehydration stress 50, 100 and 150 mm evaporation in the main plots and three levels of phosphorus fertilizer zero, 75 and 150 kilograms *per* hectare in sub-plots, respectively. Seed yield traits, seed yield *per* square meter, plant height and days to 50 % flowering was measured and recorded. Analysis of variance showed that all traits were affected by stress and highly statistically significant difference in the level of 1 % showed. The effect of phosphorus on all traits except plant height was significant at 1 % level. Mean seed yield *per* plant and grain yield *per* square meter in the interaction of stress and dehydration showed the highest phosphorus levels of these traits, respectively 8.36 and 185.74 g dehydration stresses 100 mm and P 150 kg *per* hectare were obtained. It is worth noting that the lowest overall rate of traits mentioned in 150 mm irrigation capacity was obtained. However, the results indicate to achieve optimal performance in addition to irrigation parameters must also input the amount of phosphorus fertilizer is remarkable.

PP-212

Study of different tension, density and phosphorous levels on yield and its components

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Nigella sativa is from Ranunculaceae family. Seed and oil seed are used as sweater, motive, windbreaker, digestion. This plant grows by indigenous in Arak province and cultivated at Shareza, Samirom and Mobarekeh state from Esfahan Province. There is a little information about effects of agronomic factors on phonological and agronomical traits in *Nigella sativa*. In order to, this experiment was designed to study of water stress, density and phosphorous fertilization effects on phonological and agronomical traits in *Nigella sativa* in 1387 at Jillanabad farm located in Esfahan. The experiment was carried out in split factorial design with three replications. The main plot was including three levels of irrigation 50, 100 and 150 mm evaporation from flash thank, sub plot was including nine treatment. Mean comparison showed that the maximum biological yield, seed yield per plant, seed yield *per* m^2 and aerial yield obtained at 100 mm evaporation from flash tank. Result showed seed yield per plant increased with increasing of phosphorous consume. Density showed different information about seed yield *per* m2 and biological yield. Biological yield, seed yield per plant, aerial yield with increasing density decreased but seed yield per m2 with increasing density increased. The maximum seed yield *per* m2 obtained in 100 mm evaporation from flash thank, 20 cm inter row and 150 kg/ ha P and the lowest seed yield per m2 obtained in 150 mm evaporation, 40 cm inter row and non use of phosphorous. Therefore, result suggests in order to suitable use from water and production of maximum yield *per* m^2, *Nigella sativa* irrigate with 100 mm evaporation from flash tank and plant in 40 cm inter row and fertilizer with 150 kg/ha P.

PP-213

Effect of climate change on ecosystem services – Medicinal plants

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Vegetation is considered as biotic indicator that is sensitive to climate changes. This study aims to assess and evaluate vegetation distribution in addition to list of plant species of natural medicinal plants under possible climate changes in wadi shueib area. The most potential services of the ecosystem in the study area are: the rangelands as grazing resources, medicinal plants that are used by local rural people for treatment using traditional knowledge and the use of many plant species (*Gundelia tournifortii*, *Rumex* sps, *Malva* sps, *Mentha* sps, etc.) as source of food used by local people. Ornamental plants that are recently cultivated by nurseries, like black *Iris, Asphodeline lutea* and *Lonicera sps*, are also utilized. Forests were always an important source of wood for fuel purposes, in addition to tourism and recreation. Climate change, therefore, is increasing the threat to these important sources and their existing ecosystem system are continuing to deteriorate mainly because ecosystem is so fragile and because of overexploitation, far exceeds the carrying capacity of the land, climate change ,change land use and urbanization. Desirable several important medicinal plants have been slowly disappearing and forage plant species have been destroyed (personal communication with local people). The Mediterranean region is unique in the world from the standpoint of plant genetic resources and plant diversity, as its situation near the Cradle of Agriculture in the Near East led to an early introduction of plant cultivation. More than 360 species are reported to have their primary or secondary centers of origin in the Mediterranean. The region is also consider as one of the most important centers of diversity for a number of globally important crop plants including many cereals, food legumes, vegetables, forages, fruit trees and nuts. It is estimated that one-third of household food

and livelihood security comes from the diversity and the richness of the Mediterranean flora. At least, 25000 species of higher plants are recorded in the region, a high proportion of which are endemic. Unfortunately, there is a lack of information about the effect of climate changes on the biodiversity in Jordan that represents Mediterranean, arid and semiarid conditions. This is of crucial importance for planning existing genetic resources and conserving them from the threat of adverse climate change. Four choosing sites of different gradients of altitude and rainfall were sampled. with the aid of Geographical information systems (GIS), land use map, , all sampled locations were recorded by GPS. The study will investigate the relationships between medicinal plant distribution and the different climatic variables such as temperature and rainfall. The relationships will be correlated with land characteristics including altitude, slope, and exposure, to derive any possible relationships that can be used for modeling purposes.

The results of ground survey for choosing sites showed that site number I north exposure included about 142 plant species , site number 1 south exposure 146 plant species, site number 2 south exposure a total of 102 plant species was recorded , site number 2 north exposure included about of 106 plant species site number 3 north exposure included 127 plant species, site number 3 south exposure included 118 plant species, site number 4 north exposure a total of 121 plant species and site number 4 south exposure a total of 97 plant species.

PP-214

Effect of salinity on germination of some medicinal plants

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Salinity is of the significant agricultural handicaps restiricted to cultivated wide range of crops in worldwide. Related to climatic changes and unconscious agricultural practices, salinity problems in agricultural soils have gradually increased. In this mean, determining salt-tolerant plants has been gained great importance. Medicinal and aromatic plants cultivation became popular in wide field conditions in the last few decades. Anise (*Pimpinella anisum* L.) and cumin (*Cuminum cyminum* L.) are of the most cultivated and exported medicinal plants in Turkey. In the last decade, some soil problems limited yields have come out their main production regions that they have been cultivated some decades. New production regions may be needed in the near future. Thus, we aimed to determine salt tolerance cababilities of these significant medicinal crops in the present study. Thereupon, anise and cumin seeds were subjected to different salt compounds (NaCl, $CaCl_2$, KCl, and $MgSO_4$) in various doses (0, 50, 100, 150 and 200 mM) controlled laboratory conditions to analyze the effects of them.

In conclusion, seed germination decreased significantly by increasing salinity levels. For cumin, the inhibition of germination by salt solutions was in order of $MgSO_4$ > $CaCl_2$ > KCl > NaCl. Although germination was recorded for cumin at all NaCl concentrations, the maximum germination was obtained at 50 mM of NaCl. Meanwhile, cumin was less sensitive to any kind of $MgSO_4$ levels with compared to the other salt solutions. For anise, the inhibition of germination by salt solutions was in order of $CaCl_2$ > NaCl > $MgSO_4$ > KCl.

PP-215

Study of breaking dormancy methods on *solanum laciniatum*

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Solanum laciniatum is from Solanaceae family and used as drug plant in medicine industries. Seeds of *Solanum laciniatum* have dormancy. This research was carried out in order to breaking dormancy of seeds of *Solanum laciniatum* at Esfahan agriculture research center during 1388. Used treatments for breaking dormancy were including control, sulfuric acid 1 N (2, 4, 6 minute moisten), sulfuric acid of 100 % (30, 60 and 90 second moisten), crashing of seed coat during 1 minute, concentrations of Kno3 (0.1, 0.3, 0.5, 0.7 and 1 %), PEG (25 and 50 %), moisten in water during of 12 and 24 hours. The highest germination percentage obtained in alternative temperature of 20 centigrade to 8 hours and 5 centigrade to 16 hours. The minimum of germination percentage (11 %) belong to control treatment. The highest germination rate was obtained in sulfuric acid 1N to six minute. The result showed that seeds of this plant have an internal dormancy.

PP-216

Evaluation of different level of nitrogen and plant densities on morphological, agronomical and medical componet of *echinacea purpurea* l.

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Echinacea purpurea L. is perennial herbaceous of Asteraceae family. According to recent research, this valuable medicinal plant is very useful for immune system stimulant, common cold, influenza, wound healing. The experiment was carried out in order to evaluate different levels of N fertilizer and different densities on yield and its component, and effective components in *Echinacea purpurea*. Experiment was done in split plot design with three replications in farm of Isfahan Agriculture Research Center. The N fertilizer with levels of 0, 75, 150 and 225 kg/ha were as main factor and different densities including 15, 30 and 45 cm were sub factors. Analysis of variance during two years showed significant difference for all traits exception to number floral ligule and leaf width in different levels of N fertilization. The different densities showed significant differences for all traits exception for flower diameter, flower height, number of flowering stem, internode on lateral stem, and length of ligule flower, weight of capitol and 1000_ weight seed. Interaction N and density, year and N, year and density expressed significant differences for all treats. Year effect showed significant differences for all traits exception for wet weight of root and 1000_ weight seed. Mean comparison of characters during two years, showed that traits exception wet and dry wight of root per plant and 1000_ weight seed during the second year was more than the first year. Mean comparison of interaction density and N fertilizer showed that yield components including wet and dry yield per plant, number of flower *per* plant, plant height, number of leaf *per* plant obtained levels of N 225 kg/ha and 45 cm. Mean comparison of seed

yield showed that the highest seed yield obtain in 75 kg/ha and 30 cm inter row distance. Result of chlorogenic acid on foliage and root yield showed that chlorogenic acid in foliage had no significant difference during two years but in root observed significant difference during two years.

PP-217

Medicinal species of *rumex* l. Occurred in Azerbaijan

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Azerbaijan with its biological diversity is one of the richest countries of Caucasus. Most of the plants in the Azerbaijan flora are useful and important for application in the various areas of national economy. As a result of the ecological disbalance the need of population in natural medicinal plants is gradually rising. That is why study of the medicinal plants is so important. Species belonging to the family Polygonaceae Lind. are characterized with specific appearance, clear morphological and medicinal features. Species of the family are widely spread both in the mountainous and plain territories of Azerbaijan. Genus *Rumex* L. has a special place in this family. Species of the genus are easily identified with the structure of their fruits. It is also possible to identify species according to their morphological features before the period of fruiting.

Last investigations show that the species of the genera are able to reproduce interspecific hybrids. Species of *Rumex* are widely spread and useful for food, medicinal use as well as painting substances. The following species are rich with chemical composition and in use as medicinal plants: *R. acetosella* L., *R. acetosa* L., *R. crispus* L., *R. confertus* Willd, *R. obtusifolius* L., *R. tuberosus* L. There are 6-15 % vitamin C, 0.80 % emodin, xrizofanol that belongs to antraquinone combination and vitamins K, PP.

PP-218

Varietes and production of chamomile, *chamomilla recutita* l., In slovakia

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Slovak republic territory 49.035 sq. km lies in Central Europe, in a favorable climate in the temperate zone of the Northern hemisphere. Chamomile is traditional Slovak medicinal plant, which is used in folk medicine internally as a digestive aid, for its anti-inflammatory and spasmolytic properties and externally for the treatment of irritations of the *skin*. Medicinal useful elements are observed primarily in the flowers (anthodia), which are used as a drug (*Chamomillae Flos*). It has come naturalized in almost all on Europe, but where it's not endemic; the necessary amount of drug is produced by cultivation. Whole production until the 1955 of the Slovakian chamomile came from the collection in the wild nature. The wild chamomile raw material was usual collected by seniors and Gypsies in the Slovakian Lowland and sold to next pharmaceutical processing. The classification of the populations into the three chemo type groups (A, B, C and D) determining by the internationally recognized and adopted chemo taxonomical system by Prof. Dr. H. Schilcher. The quantitative and qualitative characteristics of essential oil and its composition for wild chamomile populations in the Slovakian Lowland show that there is a highest volume of /-/-α-Bisababoloxide A averaged 43.2% belonged to the chemotype "B" group and low volume of essential oil from 0.4 to 0.6% (especially East-Lowland). Breeding methods for selection of these constituents were developed and used successfully in developing new cultures. During the years 1972 to 1992, the varieties '*BONA*' ,'*NOVBONA*', a diploid and '*GORAL*','*LUTEA*', a tetraploid, were developed through selection and breeding in Slovakia. Preferred cultivars in Slovakia are '*LUTEA*' and '*BONA*' belonged to the chemo type "C" group. Contents of essential oil is from 0.6 to 1.1% with volume of phytotherapeutically effective /-/.α-Bisabolol from 42.0 to 48.0% and Chamazulene from 16.0 to 20.0% .First quality chamomile drug could be delivered directly to the processing enterprise. The last twenty years the sale price of flowers were increased to value approximately from 2.2 € to 5.5 €/ kg. An average dry flower yield is about 400 kg/ ha, is resulting in a product worth from 3,500 € to 4,000 €. In regard to the results of plant population biology methods, yields of chamomile can reach 1,000 kg/ ha under optimal conditions. From 2000 till 2010 year cultivation areas of chamomile in Slovakia have occupied from 150 to 550 ha, according to market demands. These demands are much influenced by the amount of chamomile collected from natural resources, which reached 30.0 to 50.0 %. Producers mainly for west European countries record export.

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PP-219

Cultivation of multifunctional fast-growing woody plant common osier (*Salix viminalis* L.) on arable land with emphasis to its therapeutical effects

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Purpose of the article is to show the importance of common osier (*Salix viminalis* L.) as a fast-growing woody plant with the emphasis of its production and therapeutical effects. There are mentioned other species of osier genus (*Salix* L.), which can be used as an ornamental, basket production, remedial, energetic, as well as medicinal plants. Energetic utilization of wood biomass obtained from common osier records more important capability nowadays. Using of osier species for different therapeutical effects is going to be significant. The aim of the research paper is to evaluate the accumulation potential of fast growing basket willow (*Salix viminalis* L.) cultivated for energy purposes on human planted plantation. The experiment for growing of different basket willow varieties was realized in the agri-ecological conditions of Experimental Base of Slovak University of Agriculture in Nitra (Slovak Republic).

Acknowledgement

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PP-220

Screening for resistance to wilting in sesame genotypes selected from a world collection and mutagenesis programme

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Sesame (*Sesamum indicum* L.) is an important oil plant of Turkey that has also pharmaceutical and medicinal uses beside food industry. The mutagenesis programme at Akdeniz University aims at developing sesame cultivars suitable for intensive management including wilting tolerance. This study was conducted in the field of plant mutation project, Akdeniz University Campus, Antalya under second crop conditions in 2007-2008. At this study, 19 genotypes selected from world sesame collection, 4 mutant genotypes and 2 local cultivars were sown. The experiments were conducted according to Complete Randomized Block Design with three replications. The percentage of disease was determined by counting plants that have symptoms. Plant counts were made twice. In 2007 results was found that; a mutant genotype (Mug400/488) released as "Birkan" and collection entries, No 564, 571, 313 showed highly resistant and collection entries, No 65, 19 and 606 showed highly susceptible to wilting. These resistant genotypes can be used for direct use and genetic resources to improve disease resistance.

PP-221

Production of organic certified medicinal and aromatic plants in bulgaria

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Organic certified production of medicinal and aromatic plants (MAPs) in Bulgaria started 2002 with the Organic Herbs initiative of Bulgarian labour ministry and UNDP with expertise support of Academy of Sciences. 8 Support centers with nurseries for organic seeds and seedlings of different MAPs, trail plots, demonstration and production fields, driers and primary processing facilities were managed. Main cultures were sage, lemon balm, peppermint, valerian, mountain tea, savory, chamomile, dog-rose, lavender, thyme, hyssop, and marigold. Statistical data of Ministry of Agriculture show an organic certified growing area of 1 428 ha which is a small part of total 37 865 ha with MAPs in 2007. *Lavandula angustifolia* with 500 ha and *Rosa damascena* with 300 ha are top-organic MAPs. Much bigger area of ca. 155 793 ha is certified grassland and protected areas for wild collection of herbs and wild berries. Most Bulgarian MAPs are produced for export: - UNCTAD code group 1211 in 2007 with an amount of 9 217 tons.

PP-222

Effects of irrigation water salinity on germination, emergency, biological yield, essence quality and quantity of moldavian balm (*Dracocephalum moldavica* l.)

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In order to evaluating effects of water salinity of irrigation on different growth stages of moldavian balm 3 sets of experiment were conducted in agricultural and Nutural Resources Center of Esfahan in 2007. In germination stage, 14 water salinity treatments (0.3 – 39 dS/m) with 4 replications were applied on seeds in germinator, In emergency stage in green house and in field 8 water salinity treatments were applied. According to the results, maximum and minimum germination percent and rate were obtained in control (96 % , 14.7 seed per day) and 39 ds/m (0 % and 0) respectively. 59 % of seeds in control and 0% in 12 dS/m were emergenced and maximum emergencing rate was 24.8 seed per day in control. In the field, maximum and minimum biological yields were 1041 and 256 gr/m^2 dry biomass in control and 21dS/m respectively. By increasing salinity from 0.3 to 21dS/m, hieght of plants reduced from 75.7 cm to 41.9 cm and amount of essence in m^2 reduced from 3.3 cc to 0.9 cc. There was no significant difference between percent of essence in various treatments. Basic components of essence (neral, geraniol, geranial, neryl acetate and geranil acetate) varied from 64.4% to 81.3%.

PP-223

Essential oil composition of iranian dill (*Anethum graveolens* l.) Under limited irrigation conditions

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The influence of water deficit during vegetative and reproductive stages on essential oil composition of Iranian dill was evaluated in 2006 and 2007 at the Research Farm of Faculty of Agriculture of the University of Zanjan. Experiments were carried out on the bases of randomized complete block design in four replications. Irrigation treatments were allocated to main plots and harvest times were assigned to sub plots. Irrigation treatments were full irrigation (control) to achieve 100% of field capacity (FC) during the growth season, two moderate (66% of FC) and two severe (33% of FC) water stresses during vegetative and reproductive stages. The essential oil of the vegetative parts, flowers and seeds were isolated by hydro distillation and analyzed by GC and GC/MS. The main oil constituents of the vegetative parts and flowers were α – phellandrene, β – phellandrene and β – pinene, while that of seed oil was carvone. The other main component in flowers and seeds was limonene. However, limonene was not found in the essential oil of vegetative parts. The amount of limonene and dill apiol increased under severe stress, while carvone content increased under moderate stress. The quatity of β – phellandrene was unaffected by irrigation treatments, but the amount of α – phellandrene decreased under moderate and severe water stress.

PP-224

The possibilities that domesticated of endemic *origanum micrantum* vogel

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The genus *Origanum* is represented in Turkey by 22 species or 32 taxa, 21 being endemic to Turkey. One of them, *O. micranthum* is

perennial and semibush. It is distributed in South Anatolia and grows on rocks and sides.

This study was conducted to find out of the possibilities domesticated endemic and sub-shrub *Origanum micrantum* Vogel which was collected from Hıdıruşağı /Adana (Feke) and Çeşni, Gülek boğazı, Dartma/İçel (Tarsus) villages. It was carried out at experiment area of Field Crops Department, Agriculture Faculty. In the research, seed and short cut branch were used for propagation, the seeds collected from wild flora were applied different concentration of GA3 (250 and 500 ppm) and germination rate was very low (7.1%). However, cut branch gave good results.

The plants that propagated by cut branch were transplanted into plots that arranged in the complete randomized block design with 3 replications. They were able to cut twice during flowering period. In the first and second cutting, the mean values of 150 plants for plant height, branch number, width and length of leaves, fresh and dry herbage and dry leaf weight per plant were 13.72 and 15.13 cm, 6.34 and 9.10 number per plant, 3.64 and 3.53 mm, 4.87 and 5.22 mm, 11.41 and 13.39 g plant^{-1}, 4.40 and 6.59g plant^{-1} and 3.39 and 4.81 g plant^{-1}, respectively. Essential oil content of in the first and second cutting was 0.41% and 0.33%, respectively.

As a conclusion; *Origanum micrantum* Vogel was able to domesticate and propagate by cut branch.

PP-225

Breaking seed dormancy of *Centaurea behen* L.

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Aerial parts of *Centaurea behen* L., a medicinal plant, are being collected indiscriminately, thus it is an endangered species. Tetrazolium chloride test revealed that the seeds were 92.2% viable. Therefore, knowledge of breaking dormancy of germination is essential to the survival and cultivation of this species. Fifteen treatments (sulfuric acid (98 %,15 and 30 sec), sulfuric acid (75 %, 30 sec), GA_3 (1500,2000,2500 ppm, 48 h), ethephon (250,500 ppm, 48 h), IBA (500 ppm, 15 sec and 250 ppm, 30 sec), ethanol (96%, 24 h), 2, 4-D (250,500 ppm, 48 h), dry heat (60 °C, 12 h) and chilling (5 °C, 7 day) were used to break seed dormancy of this species. Sulfuric acid (98 %, 15 sec), sulfuric acid (98 %, 30 sec), GA_3 (2500 ppm, 48 h), GA_3 (2000 ppm, 48 h), GA_3 (1500 ppm, 48 h), IBA (500ppm,15 sec), 2,4-D (250 ppm,48 h), dry heat (60 °C, 12 h) and chilling (5 °C, 7 day) increased germination 23.4 %, 30.0 %, 58.0 %, 48.7 %, 39.0 %, 49.0 %, 8.0 %, 7.0 % and 8.4 %, respectively. Whereas, other treatments had no effect on germination. The results revealed that seed of *C. behen* had nearly 100 % dormancy and it may have both exogenous and endogenous dormancy. The treatments that broke dormancy with the greatest degree of success were GA_3 (1500-2500 ppm, 48h) and IBA (500 ppm, 15 sec) and to a lesser degree sulfuric acid (98 %, 15 and 30 sec) as well.

PP-226

Identification and introduction of therapeutic properties of different types of honey from medicinal plants (Case study: Golestan province of islamic republic of Iran)

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Bees for make the honey, collect Nectar of different flowers and Properties of this bitter drink nectar flower and fruit plants is achieved, The process is transferred to honey sweet It depends on the color of the plant That the supply has bee, Production per kg of honey, 2 million on bees to land on the flowers And nectar they collect to Despite being sweet honey if a certain amount is used, is effective for any disease. Golestan province in the north Iran to the ecological and geographical conditions suitable for growing various trees, forests, plants, pasture, and garden and crop conditions ideal for producing very different kinds of medicinal properties of honey quality experience is desirable. The aim of this study highlight the important role of honey in treatment of various diseases that source from different plants, nectar trees, etc. and can be trusted to get the community to properties it encourage people to production and instead of to chemical drugs using . To do this, Golestan province Divided into four regional and on Herbs and their honey production study was done. That this study Identifying plants in different regions, Resolution Plants Using reliable sources of scientific and FAQ Owners and honey bee sales is accompanied. And thus, the vegetation in different regions most types of honey plants Regions a combination of one or more plant species is obtained. And finally review some of the health benefits of honey of the mixture are combined with Herbs and other resource use is defined. Posts honey from different plants in different regions province obtained, Boiled with various combinations, oils, extract plants, Disease can be treated, Blood sugar, Fatigue, Reduction, Cholesterol, Treatment of gastrointestinal infections , blot eliminating wrinkles and skin, Heart disease etc Be useful.

PP-227

Use and cultivation of medicinal and wild fruit plants of Botswana

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Wild plants have been used as medicine and fruits for centuries by hunters and gathers. Today their use is no longer at a small scale but at a large scale for economic gains and to meet the needs of an increased population. Also, the availability of improved processing, packaging and storage techniques have increase their use to meet the demand for improved health of people. Harvesting of some wild plants therefore is no longer done sustainable hence it might harm the biodiversity. Cultivation of plants species which are over harvested is one measure to meet their demand and while also ensuring their conservation. This study therefore determined plant species used for medicine purposes and those used as fruits. It also aimed to determine whether there are being propagated and if not to document whether there is a possibility that they can be propagated. It was found that there are numerous species used as medicine and fruits. Cultivation of some of these is at a very small scale being just for trial purposes in small gardens. According to the available literature it is possible to propagate most of these species.

Harvesters of plants for medicine and fruit purposes need to be sensitized that for conservation purposes and continued harvesting to meet the increased demand they need to cultivate the species they harvest.

PP-228

Effect of hybrids on sugar and carotene content in carrot root

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Carrots are used both as a remedy and in a variety of tasty dishes as a diet. It is valuable due to its high sugar and carotene content. It is used both raw and cooked. A number of carrot hybrids are known.

Both sugar and carotene content were studied in the root of the following hybrids: Nanco, Tamino, Puma, Jaguar and Major. Field trial samples were taken during the 2-year period (2007, 2008) in order to conduct the chemical analysis required.

The average values of both sugar and carotene content were obtained. The average sugar content in carrots was 5.98 %, preceded by the hybrid Nanco (6.43 %) and followed by Jaguar (6.32 %) and Major (6.08 %). The least sugar content was registered in hybrids Puma and Tamino, 5.81 and 5.28 % respectively.

The average carotene content was 14.92 mg % preceded by the hybrid Puma (17.23 mg %). Hybrids Jaguar and Nanco ranged second and third (15.91 and 14.52 mg % respectively). Carotene content in hybrids Tamino and Major was 13.83 and 13.12 mg %, respectively.

The sugar and carotene synthesizing potential varied in the carrot hybrids analyzed. This may be attributed to their genetic properties. The carotene remedy effect was of special interest.

PP-229

Traits variability in uncultivated marshmallow (*Althaea officinalis* l.)

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Traits variability in uncultivated marshmallow was analysed under *in situ* conditions. The natural habitats of this plant are placed alongside the river banks (Sava, Danube, Tisa), as well as, in wet meadows, close to roads and within many weed associations.

The following traits were analysed: plant height (cm), number of shoots per plant, leaf length and fresh root yield (g). The traits of the population were quantified over: means, standard deviation, coefficient of variations, asymmetry (β_1) and kurtosis (β_2) of the normal frequency distribution curve. Significant variations in traits, especially in the number of shoots per plant and the root yield (CV=41%, CV=44%) were observed.

The frequency distribution of observed traits was mainly asymmetric ($\beta_1 > 0$) and elongated ($\beta_2 > 3$) in relation to the normal distribution.

PP-230

Plant extracts implementation in mineral mud originated from spa vrujci

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Spa Vrujci is situated in a narrow valley, on the banks of the Toplica River. Thermal waters bring the finest mud from the depths, rich with minerals, and lay it in the vicinity of the source and along the Toplica River. For therapeutic purposes mineral water is used for bathing and drinking while peloid mud is used in wrappings for different treatments. Medicinal mud consists of tiny, fine particles that enable close contact with the skin. The strong therapeutic effect is enabled by thermally and chemically interaction with the skin, and the whole organism by absorbing chemical substances through the skin. Applying this bluish mud to the body, combined with exposure to the sun, aids in the treatment of various rheumatic diseases, sciatica, varicous veins, skin diseases. These therapeutic effect are improved by plant extract implementation (*Violae tricoloris herba extract, Vaccinium myrtilis extr, Hippocastani semen extract, Salicis cortex extractum* some of the palnt mixtures used). The mineralogical composition of both crystalline and amorphous phases of the mud was determined by combination of X-ray diffraction and FTIR spectrometry. The chemical composition was determined by ICP-OES. Besides the main components Si, Al, Fe, Ca, Mg, K, Na and Ti, essential and beneficial elements Cu, Zn, Mn, Ni, Mo Co and Se and some heavy and toxic elements such as Pb, Cd, Hg, As, Sb, Tl, Bi and Te were determined.

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PP-231

Chemical, ecological and morphological characteristics of *Dictamnus albus* L. in the culture on the ter ritory of Serbia

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Morphological researches (biomass detected by measuring of stem height, number and size of leaves) were done in natural conditions of Sićevačka Klisura, as well as chemical analyses. The chromatogram of ether oils showed the presence of a larger amount of chemical compounds (nerolidol, germakron, citronelol, α-terpineol, etc). *Dictamnus albus L.* is an aromatic species, which is rather rare in Serbia at natural sites and does not yield a biomass which could have a significant economic value, although there have been attempts in this direction. According to the study results, it can be raised very successfully in plantations and it can produce economically interesting amounts of drugs. The entire plant has an odour similar to lemon or cinnamon, because it contains a significant percentage of essential oils (up to 0.25%). Our native medicine uses its root *(Dictamni radix)* and the upper above-ground part of the plant in flower *(D. herba)*. It is most often used as a sedative. The tea made of its leaves is used against stomachaches, in bad digestion and against pains due to convulsions and gases. The root is used as a medicine for increasing and stimulating the excretion of mucus. This plant

species can be used as a culinary spice, and it can be used also in the manufacture of alcoholic drinks, tobacco for smoking or chewing and other products.

PP-232

Studying the effects of planting and irrigation date on morphological characteristics of cumin

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Cumin (*Cuminum cyminum* L.) is one of the most important herbs which have many applications in food and pharmaceutical industry. In order to investigate its drought resistance and determine the best planting date, this experiment had been conducted in the form of split plot RCB design with 3 iterations. Treatments were planting date (main plot) at 4 levels (25th Nov.-D1, 27th Dec. D2, 19th Feb. D3 and 19th Mar. D4) and irrigation date (sub-plot) at 4 levels (full irrigation I1, double irrigation (seed germination and stem elongation) I2, double irrigation (seed germination and flowering) I3 and double irrigation (seed germination and seed formation) I4 in 2007-2008. Morphological characteristics under study were the number of umbels per plant, number of seeds per umbel, lateral shoots and final height). Planting date had significant effect on number of seeds per umbel, number of umbels per plant and final height at 1% level. Also, irrigation date had significant effect on the characteristics of number of umbels per plant, number of lateral shoots at 5% level. Interaction of planting date and irrigation date were significant for the number of lateral shoots at 5% level. Mean comparison was performed by Duncan test and it showed that there is a significant difference among the means of all characteristics at different treatments of planting date at 5% level. Furthermore, there were significant differences among means of characteristics at different dates of irrigation for number of umbels per plant and final plant height. In addition, comparison of means indicated that there were significant differences among interaction of planting date and irrigation date for all characteristics at 5% level. Thus, with regard to the climate of the area Birjand, Iran, planting on 27th Dec. with full irrigation is recommended.

PP-233

Peculiarities in ontogenesis of *Arnica montana* l. In Bulgaria

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Arnica montana L. is one of the most famous herb in Europe but not so well-known in Bulgaria. Recently *Arnica montana* populations are decreasing in its original habitats due to lost of habitats and over-harvesting for medicinal purpose. The species is protected in many European countries. The aim of this study is to follow up the stages of ontogenetic development of *Arnica montana* and the possibilities for its acclimatization at different altitudes in Bulgaria. Phenological observations and biometrical measurements were carried out. The results show that adaptation of the plant to altitude 1450 m is successful in the region of Mt. Vitosha. The climatic and soil conditions in the region are suitable for the growth of *Arnica montana* L. These are preliminary data and the research will be continued.

PP-234

The demand for fresh spice herbs in the world and in Serbia

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In the year 2009, the demand for spice herbs in the world market was estimated at 7.7 billion dollars, and grew by 3% per year. Out of that amount, almost one half is the demand for fresh spice herbs. The participation in the sale of fresh spice herbs has a tendency of constant growth. This is, above all, caused by the growing interest of consumers for healthy food – certified food, with high nutritive value, and by its popularisation through new recipes.

The use of spice herbs is in constant growth, especially in the last fifteen years, since this production, to a great extent, began being performed by the principles of certified agriculture – integral and organic agriculture.

In Europe, the highest demand for fresh spice herbs is marked in Great Britain, Germany, France, and in Italy, as one of the traditional consumers of this sort of agricultural products. In Serbia, the growth of the demand is evident, particularly in wholesale and supermarkets.

The greatest demand is for fresh parsley, basil, coriander, thyme and frankincense. The production of fresh spice herbs is one of more profitable types of production in agriculture. Thus, by the subsidizing plantation growing of spice herbs and by giving bonuses in purchase, their production, turnover and export would be significantly encouraged. To accomplish sale, our producers should meet the necessary product standards (GLOBALGAP, HACCP, etc), so as to achieve the required quality of the made product. There should also be improved the forming of various interest groups of fresh spice herb producers, in order to perform organised purchase and "build" a modern distributive-selling infrastructure (purchase centers with freezers, refrigerator cars, modern market centers, etc).

PP-235

Effects of sowing date and nitrogen rate on yield and essential oil production of chamomile (*Matricaria chamomilla* l.)

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A field experiment was carried out in 2007 at the Research Farm of the University of Tabriz in order to evaluate the effects of sowing date and nitrogen rate on yield and essential oil production of chamomile (*Matricaria chamomilla* L.). A factorial set of treatments was arranged on the basis of RCBD with three replications. Factors consisted of sowing date at 30 April, 10 and 20 May and nitrogen fertilizer rates at 0, 50, 100 and 150 kg / ha. Results showed that chamomile flowers could be harvested twice in Tabriz. The highest biomass, flower dry weight in the first and the second harvests and capitol diameter in the first harvest were obtained from the first harvest and sowing date (30 April). Also, nitrogen application at different rates had significant effects on some of the measured traits. The highest number of flowers

per plant, flower dry weight in the first and second harvests and essential oil yield were achieved from the first harvest when the highest levels of nitrogen were applicated (100 and 150 kg / ha). Therefore, the highest essential oil yield of chamomile can be produced from the earliest sowing date and the highest nitrogen application.

PP236

Influences of applied nitrogen on seed yield, yield components and oil content of black cumin (*nigella sativa* l.)

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There is little information about N fertilization of black cumin (*Nigella sativa* L.) at semiarid conditions. This research was carried out to determine the optimum dose of nitrogen (N) fertilizer for obtaining maximum yield. The effect of different doses of nitrogen (0, 20, 40, 60, 80 kg ha^{-1}) on seed yield, yield components and oil content of one population of black cumin (*Nigella sativa* L.) were studied in a field experiment in Central Turkey (Eskisehir) in 2009. In the trial, experimental design was randomized block design with three replications. Basal fertilizer (P_20_5 at a rate of 40 kg ha^{-1}) was applied before sowing. As yield components, biological yield *per* plant, plant height, number of branch, number of capsule, capsule diameter, number of seed per main capsule, seed weight *per* main capsule, 100-seed weight, seed yield *per* plant were evaluated. The highest seed yield (1622 kg ha^{-1}) was obtained from 40 kg ha^{-1} N.

PP-237

Efficiency of topdressed nitrogen sources and nitrogen rates on yield and yield components of winter poppy (*Papaver somniferum* l.)

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Both capsules for medicinal uses and seeds for culinary purposes of P*apaver somniferum* L, has an economic importance in the world. Yield of poppy (P*apaver somniferum* L.) can be significantly affected by environmental conditions and fertilizer applications. This study was conducted to determine the effect of nitrogen sources and nitrogen rates on seed yield and yield components of poppy in semi-arid conditions in 2003 in Central Anatolia. A factorial randomized complete block design with three replications was used in the experiment. Two N sources, ammonium nitrate (AN) and ammonium sulphate (AS) were applied on the soil as topdressing treatments in early spring including; 0 kg N ha^{-1}, 100 kg N ha^{-1} and 120 N ha^{-1}. Half of the nitrogen rate was applied as basal broadcast with phosphorus (P) at a standart rate of 50 kg ha^{-1}. The traits determined were seed yield, capsule yield, seed yield per plant, plant height, number of branches, number of capsules, capsule yield per plant, capsule width, capsule lenght, capsule index, number of rays on stigma. Effects of N rates and N source on seed yield and capsule yield differed significantly ($p<0.01$). Plant height, number of branches, number of capsules, capsule yield per plant, seed yield per plant, capsule width, number of rays on stigma were significantly ($p<0.01$) affected by N rates. AN x 120 N ha^{-1} gave the highest seed yield (1406.2 kg ha^{-1}) and capsule yield (1214.6 kg ha^{-1}).

PP-238

Comparative study of valuable medicinal species of *Achillea millefolium* group in turkey and bulgaria 1. Biometrical assay of field-grown plants

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The present work is a part of a joint project aiming to introduce in field conditions perspective medicinal species of *Achillea millefolium* group originating from Bulgarian native flora by comparing biological, phytochemical and physiological performance of plants in both countries. The study involved the species *A. collina* and *A. asplenifolia* as well as cv. "Proa". Three biometrical parameters were scored (height of plants, yield of fresh and dry herba). Two harvests in Bulgaria and three in Turkey were performed. All parameters of both species and cv. "Proa" cultivated in Turkey showed a marked decline at second harvest, a partial recovery being observed at third harvest. *A. asplenifolia* was superior at first and third harvest, while cv. "Proa"– at second harvest. Plants cultivated in Bulgaria were distinguished by a drop of all parameters measured at second harvest. *A. collina* dominated at first harvest in yield of fresh and dry herba, and *A. asplenifolia* – in height of plants. *A. asplenifolia* dominated by all parameters at second harvest. Comparison of data from both countries showed the lower values of all parameters of plants grown in Turkey. The conclusion can be drawn that field cultivation of *Achillea* species was successful, the more perspective species being A. *asplenifolia*. Promising results for practical use can be expected.

PP-239

Development of izmir oregano (*origanum onites* l.) Cultivation in Turkey

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Oregano is one of the important export products of Turkey. Turkey which exported more than 9000-12000 tons of oregano in the last five years is a leading country and oregano has an amount of 42% in the total spice export in 2008. First studies about oregano cultivation were started in Ege University, Faculty of Agriculture Department of Field Crops in 1972. Researches for agronomic and plant breeding purposes were conducted with this plant. Agronomic studies such as adaptation of plants, effect of nitrogen fertilization, determination of suitable plant density were investigated in these studies.

In 1991, some studies have been begun to obtain new cultivars which has better agronomical traits higher essential oil content by using clonal selection method in the support of TUBITAK and one commercial firm. For this purpose, the oregano seeds were collected from Antalya, Izmir and Muğla provinces and 1964 individual plants were grown in the field. Some measurements in 1362 plants in this population were made. Firstly, 100 plants were selected from initial population and identified as A clones.

Later, 30 plants were chosen from A clones and called as B clones. Then 14 plants were selected from B clones and expressed as C clones. Yield experiments with four clones belonging to C clones were established in three locations, Aydın, Kula and Izmir. Finally two cultivars, "Ceylan 2002" and "Tayşi 2002", were registered. All consumed and exported oregano herbs were being collected from flora in Turkey until 1990. Recently, oregano farming has begun in Turkey and oregano has been grown in west Anatolia specially. The total 80% of oregano consumed and exported has been grown and 20% of that has been collected from the flora (Akın, 2009).

PP-240

Comparative study of valuable medicinal species of *achillea millefolium* group in turkey and bulgaria 2. Responses of plants to nitrogen and water regime of soil

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Physiological responses of cv. "Proa" (developed from *A. millefolium* group species) to different nitrogen and water regimes of soil were studied in the frame of a joint project between Turkey and Bulgaria. Alterations in dry matter partitioning, water content and essential oil production of plants were investigated in two pot experiments under controlled conditions differing in nitrogen and water content of soil. Under water deprivation when the water content of soil was 60 % of the water holding capacity (WHC) plants produced higher dry matter of herba. Essential oil rate of plants also increased under insufficient water application (20 % of WHC) which could be accepted as drought condition for most of the cultural plants, and under highest water content of soil (80 % of WHC) as well. Experiments with nitrogen supply showed that flos weight ratio in total dry weight increased with higher nitrogen treatment. However essential oil production was enhanced in plants by lowest amount of nitrogen application whereas higher nitrogen amounts had negative affects. Our results suggested that optimum dry matter production which produced highest essential oil can be obtained by managing nitrogen and water content of soil.

PP-241

Use R: Study correlation between essentail oils obtained from diferent species of *Lamiaceae* collected from different natural habitat types in albania

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The populations of *Origanum vulgare*, *Thymus capitatus* and *Satureja montana* collected from different agro-climatically diverse sites in Albania. The essential oils are subjected to detailed GC/FID and GC/MS analysis in order to determine possible similarities between them and the differences in their chemical compositions. The study of essential oils has shown that they are categorized by different concentrations of Carvacrol (from 2,21 % to 77,79 %), Thymol (from 0,38 % to 39,9%), γ-Terpinene (from 0,31 % to 11 %) and p-Cymene (from 0,74 to 17,4%).The statistical Cluster Analysis was accomplished by using the statistical software R. The results of essential oils distilled from different species of Lamiaceae are shown.

PP-242

Constituents of the essential oil of *Paeonia mascula* subsp. *Arietina* (Paeoniaceae) from Turkey

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The present work describes the chemical composition of the essential oil of dried aerial parts of *Paeonia mascula* (L.) Miller subsp. *arietina* (Anders.) Cullen & Heywood collected in natural habitats. The essential oil was obtained from aerial parts of the plant by hydrodistillation and analyzed by GC and GC-MS. Forty eight components were identified representing 96.9% of the oil. The main compounds were phytol (22.0%), linalool (17.8%), hexadecanoic acid (9.3%), tricosane (5.9%), nonanal (4.3%) and α-terpineol (3.7%).

PP-243

Chemical composition of the essential oil of *Satureja hortensis* l. (Lamiaceae) growing in Turkey

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The chemical composition of the essential oil of dried aerial parts of *Satureja hortensis* were analyzed by GC and GC-MS. Thirty seven components were identified representing, 97.3% of the oil. Thymol (36.8%), γ-terpinene (21.7%), p-cymene (10.2%), carvacrol (5.3%), α-terpinene (4.4%), α-pinene (3.5%) and β-pinene (3.3%) were found to be major components in *Satureja hortensis* essential oils. The results were discussed in the genus patterns in view of renewable resources and chemotaxonomy.

PP-244

Antifungal activity of *satureja kitaibelii* wierzb. Ex heuff. Essential oil

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The present study describes the chemical composition and antifungal activity of *Satureja kitaibelii* Wierzb. Ex Heuff. (Lamiaceae) essential oil. This species is native in northeastern part of the Balkan Peninsula (eastern Serbia and southwestern Romania). Plant material was collected in Sicevo gorge, Serbia. The essential oil of this plant is used as antiseptic. The essential oil profile was determined by GC and GC-MS. The main

compounds in the oil were p-cimene (25.77%) and limonene (22.14%), followed by terpinen-4-ol (5.60%) and borneol (4.94%). Using the microdilution method, minimum inhibition concentrations (MIC) and minimum fungicidal concentrations (MFC) were recorded. Commercial antimycotics bifonazole and ketoconazole were used as controls. The concentration of 5 µl/ml showed fungicidal activity against *Aspergillus niger* and *A. ochraceus,* while concentration of 2.5 µl/ml was efficient against micromycetes *A. viride*, *Cladosporium fulvum*, *C. cladosporioides*, *Penicillium funiculosum*, *P. ochrochloron* and *Trichoderma viride*. Tested oil showed better antifungal activity than commercial drugs bifonazole and ketoconazole.

PP-245

Essential oil composition of culture materials of *satureja spicigera* (C. Koch) boiss. From Turkey

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Satureja species are locally grown in Turkey for various aimes. *Satureja spicigera* is one of them sold in local markets -commonly in Black Sea Reagon- and mostly consumed as fresh. Because of it's oblique sturucture and rhizome formation, it's fresh herb and green leaf yields are high compared with other species called as 'kekik' in Turkey. This study was carried out between 2008 and 2009 in Central Anatolian conditions, from the plantation found in 2007 in Ankara. Hence the genus is sensitive to severe colds, due cold damaged parcels (from four replication) only one cutting was attained in 2008, and two harvest from following year (in 2009). First year the essential oil ratio was 0.5%, and the second year 1.81%, respectively. Essential oil yields were 13 liter and 2 liter *per* decare from each harvest in 2009. The main components were carvacrol 50.02%, 48.17, 47.32%, gamma terpinene 12.14%, 12.17, 12.22%, carvacrol methyl ether 13.03 %, 8.25, 12.17%, p-cymene 12.0%, 9.91, 12.66% and beta caryophyllene 1.5%, 2.28, 2.46%.

PP-246

Volatile oil and its components in coriander as affected by row spacing and nitrogen

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Coriander (*Coriandrum sativum* L.), one of the oldest spice crops in the world, is of economic importance mainly due to its volatile oil, principal component of which is linalool. The objective of the present study was to determine the effect of row spacing and nitrogen on volatile oil and its components of coriander seed. The field experiment in split plot design with nitrogen levels (0, 50, 100 and 150 N kg ha^{-1}) in main plots and row spacings (20, 40 and 60 cm) in subplots was carried out in Ordu (Turkey) in 2009. The results revealed that row spacing and nitrogen had no significant effect on volatile oil and its components. The volatile oil content, in which a total of 12 chemical components were identified, varied from 0.72 % to 0.78 % and row spacing of 60 cm produced higher values. The main constituent of volatile oil was linalool, ranging between 83.75 % and 87.60 %. Gamma-terpinene and delta-3-carene, the other two main components, were in the ranges of 3.24-4.65 % and 3.47-3.80 %, respectively.

PP-247

Investigation of different dry methods on quality & quantity essence of *Ziziphora clinopodioides* in Iran

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Ziziphora clinopodioides in Persian language is named *kakoti*. It is one of the medicinal and essential oil species of *Lamiaceae* Family that distributed in mountain and semi steps zone of Iran. This plant has traditional applied for various medicinal benefits Such as: tranquilizer, amplification of Stomach, anti-inflammation and antifever. Recently, it is using very much in food industrial for tasty. Investigation and recognized of native medicinal plants and determined of quality and quantity essential oil of them in agronomy and natural ecosystems are very important.

This search carried out in order to determination of quality and quantity variation of *Ziziphora clinopodioides* essence under the drying different methods in field and natural habitats. Plant Flower branches collected in July from habitat by two different slopes (north & south) from mountain at 2100 meter of sea level. Field sample were gathered in flowering time from Khorasan Razavi Agricultural education center at the same time.

The samples, after the collection were drying at tree treatments (shadow, 40 & 60 centigrade temperatures) and then essential oil of plants were determined by standard Clevenger method. Data's analyzed with Factorial Randomize Block Complete Design and SAS software. The results showed that effects of habitat, slope direction and drying methods were Significantly for essential oil percentage of plant in field and habitat ($\propto$=5%). Amount of essence was increased in field condition and it was higher at North Slope from South slope in habitat. Essential oil percentage was higher in 60°C than other temperatures.

PP-248

The content and chemical composition of essential oil of *salvia glutinosa* l. From Turkey

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This research was carried out at Organic Farming Program, Mudurnu S.A. Vocational Higher School, Abant Izzet Baysal University and the Department of Field Crops, Faculty of Agriculture, University of Ankara in 2009. The plantation was established with natural cuttings of *Salvia glutinosa* L. in 2009 year. This year, only one cutting was done and the herbage samples for essential oil compounds were obtained from this cutting. Essential oils obtained by hidrodistillation form natural and culture of herbage were analyzed by GC-MS, Hewlett Packard 6890 N model, for determination of essential oil compounds. Essential oil ratio from natural and culture area was recorded as 0.10% and 0.02 %, respectively. β-caryophyllene and 1,Z-5,E-

7-dodecatriene, constituting average 44% of essential oil, were detected as main components in the investigated essential oils.

PP-249

Essential oil composition of sage (*Salvia tomentosa* Mill.) In Gölcük natural park in Isparta, Turkey

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This study was carried out determination of essential oil composition of *Salvia tomentosa* Mill which is widespread for Turkish flora in Gölcük Natural Park in Isparta province, Turkey in 2009, July. Flowered branches of *S. tomentosa* naturally existing in Gölcük Natural Park were used as specimen. Plant materials were dried under shadow and room temperature. Essential oil rates of dried materials were detected with water-distilled for using a Clevenger-type apparatus. Compositions of essential oil were established by GC-MS. Main components were found borneol and alpha-pinene with 29.32 % and 24.65 %, respectively.

PP-250

Influence of geographic origin on the amount and quality of dalmatian sage essential oil

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The oxidative damage of biological molecules is an important event in the development of a variety of human disorders that result from overwhelming the biological defense system against oxidative stress, drugs and carcinogens. The intake in the human diet of antioxidant compounds, or compounds that ameliorate or enhance the biological antioxidant mechanisms, can prevent and in some cases help in the treatment of some oxidative-related disorders and carcinogenic events.

Natural plant products have been used empirically for this purpose since ancient times and a tendency is emerging today for their increased use. Dalmatian sage (*Salvia officinalis* L., Lamiaceae) is a common aromatic and medicinal plant native from Mediterranean countries that is in widespread use. Herb is used traditionally in Montenegro as a tonic, stimulant, carminative, antiseptic, for inflammations in the mouth and infections. Dalmatian sage is widely used as food flavouring, either as dried leaves or as the essential oil or oleoresin.

Many factors can influence the amount and quality of essential oil in aromatic herbs, such as climate and environmental conditions, season of collection, age of plants. In this study influence of geographic origin on the amount and quality of Dalmatian sage essential oil was examined.

The fresh leaves of wild-growing *S. officinalis*, were collected in May 2009 from the three different locations in Montenegro – southern part (10 m altitude, sample 1), southern-central part (800 m altitude, sample 2) and central part (160 m altitude, sample 3). Collected herb samples were extracted by hydrodistillation in a Clevenger-type apparatus for 2.5h. The obtained essential oil was dried over anhydrous sodium sulphate and stored at 6°C until analyzed.

The yield of obtained oil was evaluated gravimetrically and chemical composition was determined by gas chromatography-mass spectrometry (GC/MS). Dalmatian sage essential oil yields (w/w, on a fresh weight basis) were 1.63%, 2,7% and 2,4% for sample 1, 2 and 3, respectively.

GC/MS analysis resulted in the identification of a total of 29, 33 and 31 constituents. The main components identified were α-thujone (17,5%, 36,6% and 18,6%), 1,8 cineole (22,21%, 17,18% and 17,39%) and camphor (15,71%, 6,65% and 13,13%), for sample 1, 2 and 3, respectively. Other identified compounds in gained essential oils were α-humulene, β-caryophyllene, viridoflorol, linalool, borneol, β-thujone and camphene.

Obtained results confirmed influence of geographic origin on yield and chemical composition of wild-growing sage essential oil as well as good quality of Montenegrin sage essential oil. Good quality sage oils contain a high percentage (>50%) of thujones and a low proportion (<20%) of camphor although recent standard allows 18-43% of α-thujone and 3-8.5% of β-thujone. Content of α-thujone and β-thujone decreased in the herb oil collected from location with the highest to the lowest altitude. Regarding content of camphor and 1,8 cineole in examined Dalmatian sage essential oil, there was no established dependence on geographic origin.

PP-251

The content and chemical composition of essential oil of *Salvia glutinosa* l. From Turkey

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This research was carried out at Organic Farming Program, Mudurnu S.A. Vocational Higher School, Abant Izzet Baysal University and the Department of Field Crops, Faculty of Agriculture, University of Ankara in 2009. The plantation was established with natural cuttings of *Salvia glutinosa* L. in 2009 year. This year, only one cutting was done and the herbage samples for essential oil compounds were obtained from this cutting. Essential oils obtained by hidrodistillation form natural and culture of herbage were analyzed by GC-MS, Hewlett Packard 6890 N model, for determination of essential oil compounds. Essential oil ratio from natural and culture area was recorded as 0.10% and 0.02%, respectively. *β*-caryophyllene and 1,Z-5,E-7-dodecatriene, constituting average 44% of essential oil, were detected as main components in the investigated essential oils.

PP-252

Quantitative assessment of volatile oil from cultivated and spontaneous chamomile in Romania

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Chamomile is one of the best known medicinal plants. The flower is a vegetal product named, *Matricariae flos*. The flowers contain

0.3-3% volatile oil, flavones – apigenin, quercetin, luteolin, coumarin, sesquiterpenlactones. The entire fresh flower is used in the preparation of the base tincture in homeopathy.
The study presents information related to the volatile oil content of cultivated chamomile in Timişoara for a period of 3 years. We harvested samples form spontaneous flora too, from four different locations in the Timiş area: Carani, Gavojdia, Ghiroda and Remetea Mare. We studied four types of seeds: the Mărgăritar cultivar, the Agrosel cultivar, the Serbia cultivar and the Ungaria cultivar.
The Mărgăritar cultivar flowers have 1.09 % volatile oil, and the Serbia cultivar has 1.03 % volatile oil. The flowers of the Agrosel cultivar have a lower concentration of volatile oil – 0.96%.
Chamomile flowers from spontaneous flora have a volatile oil content range between 1.06-0.98%. In Ghiroda area, the amount of volatile oil reaches the highest value (1.06 %) compared to the Margaritar cultivar (1.09 %). The quality of the vegetal product from spontaneous flora is within normal limits from the point of view of volatile oil concentration but we cannot kip the control of pollution facts.
Volatile oil concentration in chamomile flowers is influenced by cultivars and cultivation environment. This parameter is important in establishing medicinal plants cultures as sources of vegetal products with high contents of active principles.

PP-253

Chemical composition of some *hypericum* essential oils

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Essential oils of two *Hypericum* species were researched by the method of GLC-MS: *Hypericum perforatum* L., *Hypericum scabrum* L. Essential oils were obtained by hydrodistillation for 3 hours with yield 0.1%, 0.43%, respectively. It was determined that the main components (in %) of essential oils were for *Hypericum perforatum* – thymol (22.1), β-pinen (10.5), o-cymole (8.7), cariophyllene (8.01); for *Hypericum scabrum* – β-pinen (37.09), β-myrcene (17.37), dipentene (11.1), o-cymole (8.74).
Thus, the composition of essential oils of Kazakhstan's *Hypericum* populations was investigated by method GLC-MS for the first time.

PP-254

Environmental impact on essential oil content content in Tansy

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Tansy (*Tanacetum vulgare* L.) is used in tradition medicine as an antispasmodic, antihelminthic, carminative, antidiabetic, diuretic and antihypertensive. Primary research aim of this stady was to investigate adaptibility of the Tansy to different stress environmental condition. Plant has been collected from two specific location in Belgrade, Serbia. One of them (Ada Huja) is polluted zone, but the other one (Topčider) is not polluted park area. Twenty two different major and minor constituents from Tansy, using the GC-MS chromatography, were separated and identyfied. The results showed that only six components of about 14 identified oil compounds, were found in the plants from both sites. The total content of identified essential oil in plants orginated on Ada Huja site was higher than in Topčider plants. Tansy from Ada Huja had larger total essential oils amount of comparing to plants from Topčider. Specific essential oil compounds of Tansy growth on Ada Huja were: germacrene D, α-cadinol, *longiborneol*, pinocarvone, santolina alcohol, spathelenol, α-thujone and undecane. Nevertheless, compounds characteristic from Tansy on Topčider were: α-phelandrene, β-phelandrene, *trans*-chrysanthenol, *p*-cresol-acetate, *p*-cumene, linalool oxide, *cis*-pinochamphone and sabinene-hydrate.
Trans-chrysanthenyl acetate and *trans*-carveol-acetate (> 50 %), according to total essencial oil amount were main compounds in plants from both localities.

PP-255

Liposomes with essential oil of *Ajania fruticulosa* (ledeb.) Poljak

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At present, the new and high-performance approaches are actively developed in the transdermal delivery, which will allow delivering exactly to point potentially an active compound – hydrophile or hydrophobe, low-molecular or polymer. There were obtained liposomes containing 30-80 % essential oils as active ingredients with mono- and sesquiterpenes.
Obtaining of liposomes with the essential oil of *Ajania fruticulosa* (Ledeb.) Poljak have the expressed anti-inflammatory and wound-healing properties. The inclusion of essential oil of *Ajania fruticulosa* (Ledeb.) Poljak in liposomes on the basis of soybean lecithine was carried out by method of emulsification (emulsifier - polyvinyl alcohol). Diameter of particles was determined by the probe scanning electric microscopy.
As a result, on the basis of phospholipids of soy with application of polyvinyl alcohol as emulsifier (ratio of lecithin:emulsifier is 1:4) the liposomes in diameter of 40-80 nm are obtained by emulsification.

PP-256

The essential oil composition of the endemic *Hypericum sorgerae* robson species from Turkey

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In this study, essential oil composition of *Hypericum sorgerae* Robson species endemic to Turkey were determined by using GC and GC-MS system. The essential oils obtained by hydrodistillation from the aerial parts of plants. Forty-six compounds were identified in the essential oils of *H. sorgerae*; undecane (17.9%), β–myrcene (11.4%), α – pinene (5.1%), nonacosane (5.1%), δ–cubebene (4.5%) and β– selinene (4.2%). Monoterpenes were shown to be the main group of the *H.*

sorgerae. The results are discussed in view of the distribution of the essential oil components in the *Hypericum* genus in means of chemotaxonomy and renewable resources.

PP-257

Composition of essential oil from endemic *Hypericum thymopsis Boiss.* species

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The composition of essential oil from *Hypericum thymopsis* Boiss. (Hypericaceae) growing in inner and east Anatolian region of Turkey was studied. It is an endemic species to Turkey. More than 49 oil components consisting of 89.2% of the total volatile components were identified by GC and GC-MS system. The essential oils obtained by hydrodistillation from the aerial parts of plants. The main components of the essential oil were alpha – pinene (29.4%), limonene (7.1%), germacrene –D (6.9%), bicyclogermacrene (5.9%) and spathulenol (4.6%) in this plant oil.

PP-258

Effects of Planting density and sowing dates on essential oil content and compositions in valerian (*Valeriana officinalis* L.)

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This study was conducted on experimental field of Abureyhan Campus, Tehran University at Pakdasht zone in Iran during 2005-2006. The experimental design was a split factorial on the basis of completely randomized block design with four replicates. The main factor including sowing dates (10 August, 1 September and 20 September) and sub factor including planting densities (40000, 80000 and 120000 plants ha^{-1}) were studied. The volatile constituents of the root part of cultivated *V. officinalis* were isolated by steam distillation and analysed by GC and GC-MS systems that were identified the 87 compositions. The results showed that sowing date and planting density significantly affected essential oil percentage, camphen, bornyl acetate and valerenal ($P \leq 0.01$) and highest all plant values were provided by the 40000 plants ha^{-1} planting density and 20 September sowing date. It was thus concluded that sowing date and planting density are the main factors effective on quantity and quality yields of valerian. Our finding may give applicable advice to commercial farmers and medicinal and aromatic plants researches for management and concern on planting density strategy and estimate of sowing date carefully for increase of quantity and quality yields in medicinal and aromatic plants farming.

PP-259

Chemical composition and antimicrobial activity of the essential oils of endemic *hypericum ternatum* poulter and *hypericum saxifragum* Robson & Hub-mor. For Turkey

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The present study describes the chemical composition and the antimicrobial activity of the essential oils from Hypericum ternatum Poulter (Hypericaceae), Hypericum saxifragum Robson & Hub-Mor. (Hypericaceae), which are endemic for Turkey. Essential oils were obtained by hydrodistillation and the components of the essential oils were analyzed by Gas Chromatography-Mass Spectrometry (GC-MS).

The essential oils contain different major components. While the major components of H. ternatum essential oil were α-pinene (38.33%), limonene (11.37%), β-pinene (11.14%) and spathulenol (7.00%), the major components of H. saxifragum essential oil were γ-curcumene (10.73%), δ-cadinene (9.33%), ar-curcumene (8.00%), γ-cadinene (7.35%), nonane (7.28%) and undecane (7.23%).

The antimicrobial activity of the essential oils were investigated against standard reference strains and resistant strains, using disc diffusion test, broth microdilution test and minimum bactericidal concentration test. Antibiotics were used positive control. It was determined that H. ternatum essential oil was more effective than the antibiotics against methicillin resistant Staphylococcus aureus (MRSA), vancomycin resistant Enterococcus faecalis (VRE), ampicillin resistant Haemophilus influenzae. H. saxifragum essential oil exhibited no antimicrobial activity against all tested strains.

This is the first report on chemical composition and antimicrobial activity of the essential oils of H. ternatum and H. saxfragum.

PP-260

Evaluation of the efficiency of essential oil components from *Artemisia annua* as an antimicrobial against *Clostridium perfringens* in poultry

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Artemisia annua is now cultivated in many parts of the world and well known for producing the anti-malaria agent artemisinin, however the plant is also rich in essential oils. In poultry production, coccidiostats with antibiotic effect (ionophores), which are expected to be banned within the EU after 2012, are applied as feed additives to control *Clostridium perfringens,* a bacterium that causes necrotic enteritis. Preliminary studies have shown that essential oil components (EOC) from *A. annua* have antimicrobial effects and therefore could be potential replacements for these agents. In the present study, antimicrobial EOCs of *A. annua* were identified and quantified by GC-MS and GC-FID, respectively. The minimal concentration of the EOC extracts exhibiting growth inhibition (MIC value) of *C. perfringens* was determined in overnight cultures of *C. perfringens* strains isolated from diseased broilers. Results show that EOCs of *A. annua* extracted with hexane and dichloromethane had mean MIC values of 170 and 270 ppm, respectively.

Additionally, it was investigated how cultivation techniques or stress-related treatments during plant growth affected the concentration or the composition of the bioactive EOCs of *A. annua*.

PP-261

The chemical composition of essential oils of *Artemisia hausknechtii* boiss. From Turkey

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The chemical composition of the essential oil *Artemisia hausknechtii* growing wild in Turkey was analysed by GC and GC- MS. Fifty two compounds, constituing 91.0% of the total components detected and also were identified. Among them, camphor (20.1%), 1.8 cineole (19.5%), borneol (6.1%), beta – thujone (5.4%) were the major components of the oil, which has obtained 0.85% yield from the aerial parts of plant.

PP-262

The *In vivo* angiogenic evaluation of *Thymbra spicata* L. essential oil

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Abstract

Thymbra spicata L. of Lamiaceae known as "zahter, sivri kekik, kara kekik, karabaş kekik" is one of the species in trade and use such as Oregano, in Turkey. *T. spicata* is used as herbal tea, herb, spice or condiment, alone or in combination with other herbs. According to ethnobotanical surveys *Thymbra* species are popularly used in various forms in traditional medicine for gastro-intestinal diseases, microbial and parasitic infections also for their anti-inflammatory, pain relieving and wound healing properties among others.

In this present study, the essential oil from aerial parts of *T. spicata* obtained from a commercial source was investigated for its *in vivo* angiogenic / antiangiogenic properties to support its folk uses and health food benefits. The essential oil was obtained by hydrodistillation, which was analyzed and documented both by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) prior to the evaluation. The main constituents of the oil were identified as carvacrol (65%) and *p*-cymene (18%). Using the *in vivo* Chorio Allantoic Membrane (CAM) assay the essential oil and its main constituents carvacrol and *p*-cymene were tested at various concentrations from 0.5-50 µg/pellet, comparatively with the standards suramin, thalidomide, and cortisone. As a result, *T. spicata* essential oil and carvacrol showed in both assays antiangiogenic activity in a concentration dependent manner. Furthermore, *in vivo* evaluations confirmed the safety of the tested oil and its components at the concentrations used.

Keywords

Thymbra spicata; essential oil; monoterpenes; GC-MS, *in vivo* Angiogenic evaluation.

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PP-263

Volatile compounds of overground part of *halimodendron halodendron* (pall.)

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The genus *Halimodendron* (Leguminosae) is represented by only one species mostly in steps, sandy and clayey deserts, by springs and saline soils in Kazakhstan. It is used in designing fences and planting deserts.

The aim of the present work was the determination of the volatile compounds of the different organs of the overground part of *Halimodendron halodendron* (Pall). The volatiles were obtained from the dried and crushed fruits, leaves, seeds by microdistillation followed by simultaneous GC/FID and GC/MS techniques. Plant was collected in the-Eastern Kazakhstan in September 2008.

Hexadecanoic acid (47,3%), (Z)-9-hexadecenoic acid (10,2%) tetradecanoic acid (4,1%), dodecanoic acid (3,9%) in seeds; hexadecanoic acid (35,8%), nonacosane (21,5%), hexahydrofarnesyl acetone (3,9%) in fruits; farnesyl acetone (10,2%), hexadecanoic acid (9,0%), (E)-geranyl acetone (5,7%), 1-octen-3-ol (4,9%) in leaves were found as the main constituents.

PP-264

Essential oil composition of *malabaila secacul* banks. & Sol. (Apiaceae)

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Malabaila secacul Banks. & Sol is reported as very variable species in Flora of Turkey and it is represented as different groups taxonomically. In this study, the essential oil composition of *Malabaila secacul* Banks & Sol., obtained by hydrodistillation has been investigated. The oils were analysed by GC and GC/MS systems. Fifty four components were identified representing 90.2% of the oils, respectively. The main compounds in the essential oil of *M. secacul* were; butanoic acid (37.1%), caryophyllene oxide (13.4%), germacrene D (10.0%) and beta- caryophyllene (5.4%).

PP-265

Content of essential oil of *artedia squamata* l. (Apiaceae) from Turkey

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The *Artedia* L. genus is a monotypic genus in Flora of Turkey and it is represented with a single species *Artedia squamata* L. In this study, water - distilled essential oils derived from the aerial parts of *Artedia squamata* L., (Apiaceae) grown in Elazig (Turkey) were analyzed by GC and GC-MS. Fifty three components representing 99.7% of the oil of *Artedia squamata* were identified of which α-pinene (57.8%), camphene (9.0%), β-myrcene (5.7%), δ-3-carene (5.3%) and limonene (5.3%) were found to be the major constituents.

PP-266

Volatile constituents of the flowers, stems, leaves and antioxidant activity of *Nasturtium officinale* R. Br.

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This study was designed to examine the chemical composition and *in vitro* antioxidant activity of the essential oil and methanol extracts of leaves, stems and flower of *Nasturtium officinale*. GC and GC–MS analyses of the essential oils of leaves, stems and flower resulted in the identification of 9, 8 and 15 compounds, representing 97%, 100% and 94.7% of the oils, respectively. The main compounds the oil of leaves were myristicin (57.6%), α-terpinolene (8.9%) and limonene (6.7%). caryophyllene oxide (37.2%), p-cymene-8-ol (17.6%), α-terpinolene (15.2%), and limonene (11.8%) were the main component in stems, whereas limonene (43.6%), α-terpinolene (19.7%), p-cymene-8-ol (7.6%) and caryophyllene oxide (6.7%) were the major constituents in oil of flowers. The samples were subjected to a screening for their possible antioxidant activities by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and β-carotene-linoleic acid assays. In the above assay, methanol extracts of leaves showed higher antioxidant activity than the oils and other extracts. The results presented here indicate that the essential oils and methanol extracts of N. *officinale* have antioxidant properties, and are therefore potential sources of antioxidant agents for the food and pharmaceutical industries.

PP-267

Chemical composition, *in vitro* antimicrobial and antifungal activities of the essential oil and methanolic extract of *artemisia houssknechti* benth. From Iran

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In this study we identified the chemical composition, antimicrobial and antioxidant effects of essential oil and methanolic extract of *Artemisia houssknechti* Totally 87 volatile compounds from the essential oil in *A. houssknechti*, were identified by gas chromatography–mass spectrometry (GC–MS). These compounds are mainly monoterpene hydrocarbons, sesquiterpene hydrocarbons, oxygenated monoterpenes and oxygenated sesquiterpenoids compounds. The main constituents in the oil were: borneol (17.17%), cyclofenchone (10.82%), camphor (10.61%), β-cyclogeraniol (7.76%), endobornyl acetate (6.99%), 1,8-cineol (5.12%). The antimicrobial and antifungal activity of plants extracts against several pathogenic microorganisms was studied by disc diffusion and minimum inhibitory concentration procedures. The results revealed that the essential oil and polar subfraction are effective mostly against *Staphylococcus aureus* and *Candida albicans*.

Results presented here may suggest that the essential oil of *T. kotschyanus* possesses antimicrobial properties, and is therefore a potential source of antimicrobial ingredients for the food and pharmaceutical industry.

PP-268

Chemical composition of the essential oil from fruits of *vitex pseudo-negundo* (hausskn.) Hand-mzt. From Iran

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This study is allocated to determine the chemical composition of the essential oil from fruit of *Vitex pseudo-negundo* (Hausskn.) Hand-Mzt., one of three species of *Vitex* genus (family Verbenaceae) found in Iran.[1] Some investigations on the chemical composition of essential oils from the genus *Vitex* were done recently.[2-5] In this study the essential oil obtained by hydrodistillation of the fruits of *Vitex pseudo-negundo* growing wild in Khorasan province, Iran, was analyzed by GC and GC/MS. The analysis was resulted in the detection of 23 constituents, representing 98.7 % of the oil. Major components of the oil were 1,8-cineole (33.6 %), α-pinene (22.0 %), sabinene (15.7 %), iso-verbanol acetate (7.1 %), and (E)-beta-farnesene (4.0 %). In the fruit oil of *Vitex pseudo-negundo*, monoterpenes predominated over sesquiterpenes, and among the former, oxygenated ones were the major constituents, accounting for 44.7% of the total.

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PP-269

Chemical composition of the essential oil from flowers, stems and leaves of *ferula ovina (boiss.) Boiss.* From Iran

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Ferula ovina (Boiss.) Boiss., which grows in Afghanistan, Anatolia and Central Asia, besides Iran is one of thirty species of the genus *Ferula* (family Umbelliferae) are found in Iran among these fifteen are endemic.[1] Several investigation has been carried out on the chemical composition of the essential oils of the genus *Ferula*, and two deals with the fruits and aerial parts of the plant.[2,3] The aim of our study is to compare the yields and to identify the constituents of the essential oils of flowers, stems and leaves of *Ferula ovina* (Boiss.) Boiss. growing wild at the flowering stage in Northeast of Iran. The colorless oils were obtained by 3-hours' hydrodistillation, using a Clevenger-type apparatus, of the flowers, stems and leaves in yields of 0.073%, 0.036% and 0.022% (w/w), respectively. GC and GC-MS revealed 20 compounds, representing 97.7% of the flower oil. The major constituents were hexyl-3-methyl butyrate (26.3%), β-elemene (15.8%), hexyl-2-methyl butyrate (14.9%) and hexyl butyrate (10.6%). The stem oil of the plant was characterized by higher amounts of β-elemene (18.5%), β-selinene (17.5%), germacrone (16.0%), germacrene B (9.2%) among the fourteen detected components, which together comprised 87.9% of the total oil. Nineteen compounds, representing 68.9% of the leaf oil, of the plant were identified. Among these, β-elemene (24.9%), caryophyllene oxide (10.8%) and humulene epoxide II (5.0%)

were the major ones.

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PP-270

Chemical composition of the essential oil from leaves of *calycanthus floridus* from Iran

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Calycanthus floridus, a member the Calycanthaceae family endemic to North America, has been introduced in Iran as ornamental shrub[1,2]. There are two varieties of *Calycanthus floridus* (Carolina Sweetshrub); *C. floridus* var. *floridus* (syn. *C. mohrii*) and *C. floridus* var. *glaucus* (syn. *C. fertilis*) [3]. In this work, essential oil obtained by hydrodistillation from leaves of *Calycanthus floridus* L. (Calycanthaceae), growing in Sabzevar, Khorasan Province (Iran), was analyzed by GC and GC/MS. Thirteen compounds representing 93.4% of leaf oil of *Calycanthus floridus* were identified. Of these, pregeijerene B (18.3 %), isobornyl 2-methyl butanoate (15.3 %), bornyl acetate (14.8 %), elemodiol<8-α-11> (14.4 %) and camphene (10.3 %) were the major components.

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PP-271

Essential oil compositions of some mediterranean medicinal and aromatic plants

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In this study, the essential oils content and composition of *Mentha pulegium* Linnaeus (Labiatae), *Vitex agnus-castus* Linnaeus (Verbenaceae), *Foeniculum vulgare* Miller (Umbellifera) and *Pistacia terebinthus* Linnaeus (Anacardiaceae), distributed or have been recently cultivated around Antalya province, were evaluated. Plants were harvested in the period when they give literally maximum essential oils. After being dried until equilibrium moisture content at ambient temperature under shade, their essential oils were obtained by steam distillation. The composition of the essential oils were identified and determined by using GC/MS. Results reflected that (+)-pulegone is the main essential oil component of *M. pulegium* with the value of 94.99 %. Anethole (75.76%), anisketone (7.56%), *p*-anisic aldehyde (4.35%), estragole (3.99%) and limonene (3.62%) were determined to be the main components of *F. vulgare*. The essential oil of *V. agnus-castus* was principally composed of 1,8-cineole (28.11%), sabinene (β-thujene) (13.89%), β-(E)-caryophyllene (9.96%), α-pinene (9.00%), limonene (5.21%), α-terpineol (3.91%) and terpinen-4-ol (2.70%). These components were replaced by α-pinene (35.09%), germacrene D (15.29%), β-pinene (7.60%), camphene (6.08%), *p*-cymene (4.29 %), caryophyllene oxide (4.70%), and *p*-cymene (4.29%) for the essential oil of *P. terebinthus*.

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Effects of sub-inhibitory concentrations of essential oils of *Mentha spicata* and *Cumminum cyminum* on virulence factors of *Pseudomonas aeruginosa*

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Pseudomonas aeruginosa is one of important opportunistic pathogens that cases serious infections resistant to many antimicrobial agents. The aim of this study was evaluate the effects of sub-MICs of essential oils of *Mentha spicata* and *Cumminum cyminum* on some virulence factors (alginate production, biofilm formation, swimming, twitching and adhesion) of *Pseudomonas aeruginosa*. Minimal inhibitory concentrations (MIC) of essential oils of *M. spicata* and *C. cyminum* were determined by macrodilution method. Alginate production, biofilm formation, swimming, twitching and adhesion in the present of sub-MICs (1/2, 1/4 and 1/8 MIC) of essential oils were determined in mucoid *P. aeruginosa* 8821M and compared with controls. The MICs of essential oils against *P. aeruginosa* for *M. spicata and C. cyminum* oils were obtained 16 and 32μg/ml respectively. The results show that all oils at 1/2 and 1/4 MICs were significantly reduced all tested virulence factors. At 1/8 MICs, *M.spicata* had effect just on adhesion but *C. cyminum* had effect on Alginate production, biofilm formation, swimming and twitching. This study showed that sub-MIC levels of *M. spicata and C. cyminum* essential oils affected some virulence factors in *P. aeruginosa* 8821M and it is probable to use of these medicinal plants for treatment.

PP-273

Essential oil polymorphysm in two *thymus* l. Species from serbia

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Species of genus *Thymus* L. are well known for their medicinal and aromatic properties. In this work we included three populations of *Th. pannonicus* and three populations of *Th. marschallianus*, which are very common in flora of Serbia and are widely used in traditional medicine. Dried leaves of each sample were examined by thermal desorption-gas chromatography-mass spectrometry. The essential oil components were identified by comparing retention indices (calculated against an *n*-alkane series) and by comparing mass spectra with published data. In one population of *Th. pannonicus* the dominant components were Neral and

Geranial (34.05 % and 51.74 % respectively) in one was α-Pinene (19.90 %) and in one population was Germacrene-D (36.91 %). In all three populations of *Th. marschallianus* Germacrene-D was the most presented (varying from 20.40 % to 66.66 %). In order to establish relationship between examined populations of *Thymnus* the total 78 compounds of essential oils was statistically analyzed through cluster analysis and PCA.

PP-274

Evaluation of six medicinal plant essential oil on controlling *Salmonella* pathogenic bacteria in comparison with streptomycin

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Study of the antibacterial effect of medicinal plants can be useful method for a sustainable controlling of those bacteria. *Salmonella spp.* is the most important pathogenic agent in human and animal. This experiment was conducted in the basic of Randomized Complete Design on bauer-kirby standard method with seven treatments and three replications to investigate the impacts of six essential oils derived from six medicinal plants on five species of the aforementioned bacteria. The plants included: Peppermint (*Mentha piperita*), Thyme (*Thymus vulgaris*), Rosemary (*Rosmarinus officinalis*), Black caraway (*Bunium persicum*), Eucalyptus (*Eucalyptus globulus*) and Yarrow (*Achillea millefolium*). The bacteria species were taken from egg crust. Two standard species of *Salmonella spp*. (Typhfimorium and Entertidis) were prepared from Razi Institute, Iran. Result indicated that the effects of the essential oils on controlling salmonella were significant. The highest and the lowest impacts were belonged to Thyme (halo average diameter = 25.6 mm) and Eucalyptus (halo average diameter = 3.4mm) respectively. It is concluded that Thyme essential oil was useful for controlling Salmonella compared with other essential oils.

PP-275

Essential oils of ornamental *Mentha* L. and *Pulegium* L. cultivars

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In 2008, a field experiment with thirteen *Pulegium* L. and *Mentha* L. species and cultivars was conducted in Lednice (Czech Republic) to determine the effect of harvesting stage (bud forming stage and flowering stage) on essential oil yield and oil constitutiens. Essential oils obtained by hydro-distillation according to Czech Pharmacopea 2002 were analysed by gas chromatography-mass spectrometry (GC-MS) HP-5MS (5% Phenyl Methyl Siloxane, 30 m x 0.25 mm i.d., film thickness 0.25 μm). The essential oil content was higher at flowering than at bud forming stage. The lowest content was found by *Mentha aquatica* 3.09 ml kg^{-1} and the highest content by *Mentha x piperita* 10.85 ml kg^{-1}. The concentration of the major essential oil constituents was (-)-menthol: 23.29% to 67.62% (the highest by *Mentha x piperitae* in the bud forming stage), (-)-menthone: 8.71% to 44.58% (the highest by *Mentha spicata* in the flowering stage), (-)-carvone: 0.81% to 61.00% (the highest by *Mentha pulegium* ´Repens´ in the flowering stage), (+)-menthofuran: 0.98% to 11.22% (the highest by *Mentha spicata* in the flowering stage), (-)-limonene: 0.23% to 2.79% (the highest by *Mentha suaveolens* ´Variegata´ in the flowering stage), eucalyptol: 0.56% to 22.86% (the highest by *Mentha aquatica* in the bud forming stage).

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PP-276

A vital problem in medicinal and aromatic plants: adulteration

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Adulteration is a significant problem for medicinal and aromatic plants and their derivatives in all over the world. Considering a huge amounts of medicinal and aromatic plants have been collected, used and traded, it can be easily seen the consequences of this problem. Medicinal and aromatic plants and their derivatives, mainly essential oils, have widely been used in food, cosmetics, and pharmaceutical industries. Besides health problems, adulteration for these products has misled people who relays on natural products and healing effects of plants. In this mean, we investigated papatya – the general name of white petalled plants, which are the members of Asteraceae (Compositae) family grown in Turkey - an important herbal tea (dried flowers) and herbal medicine (essential oil).

In the present study, five different plant species – *Matricaria* sp., *Anthemis* sp., *Tanacetum* sp., *Pyrethrum* sp. and *Leucanthemum* sp., known as papatya by the folk live in Turkey, of which flowers look like each other when their botanical and chemical properties were compared to each other. According to our investigation, there were numbers of differences among the species known as papatya. Although *Matricaria chamomile* is the real medicinal papatya that should be used for traditional remedy, other Asteraceae flowers have been also used for the same purpose in Turkey and through the world. It can be thought that the present study could be a excellent example for adulteration of medicinal and aromatic plants in Turkey and samples can easily be multiplied. To solve the adulteration problem and supply the correct standardized herbal products with desired chemical content and composition, the main road should be the cultivation and process of these plants under controlled conditions.

PP-277

Extraction, analysis and functional properties of essential oils from Apiaceae family (A review)

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Apiaceae is a large family of medicinal plants. Several noted medicinal plants such as celery, caraway, dill and parsley are among the plants of this family. Essential oils have different functional properties such as antibacterial, antifungal, antioxidant and larvicidal properties. Essential oils can be isolated from the plants applying different extraction methods. As is the

case with other medicinal plant families, the main method for the extraction of essential oils from the plants of Apiaceae family is hydrodistillation. However, new techniques such as microwave-assisted hydrodistillation, super- and near-critical fluid extraction and subcritical water extraction have also been developed. Analysis of essential oil components can be carried out using different methods such as chemical and physical tests as well as instrumental techniques including GC-MS. Researchers have used new resolution techniques to clarify the results of GC-MS analysis in the case of overlapping peaks. As best of our knowledge, there is no comprehensive review about the essential oils obtained from Apiaceae family. Therefore, in this study, the extraction and analysis methods reported in the literature applied to the essential oils of Apiaceae family have been reviewed. The main chemical compounds and the functional properties of essential oils were also classified.

PP-278

Application of spme (solid phase microextraction) to analysis of volatiles in fruits of *libanotis pyrenaica* and antibacterial activity

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Libanotis pyrenaica is a species belongs to the family *Apiaceae* and contribute at least more than 30 species dispersed in most parts of Europe except the extreme north, west and south.

SPME method, as innovative, fast, economical and versatile technology, has been applied to determine the content of volatile fraction of fruits of *L. pyrenaica* collected in western part of Poland. 38 compounds have been identified among which sabinene and β-phallandrene were the most abundant.

The antibacterial activity of essential oil was performed *in vitro* using micro-dilution broth method, allowing for the determination of the minimal inhibitory concentration (MIC). Minimal bactericidal concentration (MBC) was also defined. The panel of eight reference bacterial strains was used, including strains of Gram-positive bacteria (*Staphylococcus epidermidis* ATCC 12228, *Staphylococcus aureus* ATCC 25923, *Bacillus subtilis* ATCC 6633, *Micrococcus luteus* ATCC 10240) and Gram-negative bacteria (*Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* ATCC 13883, *Pseudomonas aeruginosa* ATCC 9027, *Proteus mirabilis* ATCC 12453). Essential oil exhibited inhibitory effect against all strains tested with different *MIC* values (0.15 – 2.5 mg/ml), however it possessed stronger antibacterial properties against Gram-positive bacteria. The low values of *MBC/MIC* ratio (1 - 8) suggest that examined oil behaved as bactericidal agent against bacteria tested.

PP-279

The study of essential oil extracted from *nigella sativa* l.

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Nigella sativa L., *Ranunculaceae* family, commonly named black cumin, is a spontaneous plant. The main compounds from lipophylic fraction are responsible for the pharmacological activity of the *Nigellae sativae semen*. The essential oil obtained by hydrodistillation from Tunisian *Nigellae sativae semen* is rich in bioactive compounds, exhibiting bactericides, antibacterial and antioxidant activities. The qualitative and quantitative analysis of essential oil were performed using GC-MS method. There were identified from *Nigella sativa* essential 30 compounds in considerable percentages, among them: the alpha- pinene (13.75 %), the limonene (2.55 %), the *p*-cymene (43.58 %), the carvacrol (2.53 %) and the tymoquinone (1.65 %). The evaluation, by different methods, of the studied essential oil shows a significant antioxidant activity.

PP-280

Assessment of essential oil composition and seed oil characteristics of *Achillea tenuifolia* Lam. in Iran

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Nineteen species of yarrow (*Achillea* L.*)* have been recognized in Iran. *A. tenuifolia* species have the wide distribution in the country. In this study, five accessions of *Achillea tenuifolia* species from different geographical regions were assessed for essential oil composition from their leaves. The essential oil yield varied from 0.15% to 0.8%. Total of 35 compounds were identified in five accessions. The major constituents of the leaves were determined as germacrene-D (6.61-69.4%), bicyclogermacrene (1.15-14.12%), camphor (0.27-14.95%), 1, 8-cineole (0-15.26%), spathulenol (4.08-34.31). The oil from the seed was analyzed for its physicochemical properties such as acid, iodine, peroxide and saponification values as well as specific gravity, refractive index and color. Fatty acids composition of the oil was determined by gas chromatography (GC). Linoleic (69.4%) and oleic (14.5%) acids were the most abundant fatty acids. The oil also contained 1.7% linolenic acid as another polyunsaturated fatty acid. The results showed that this species might be considered as a potential source for some medicinal and food applications.

PP-281

Geographical variations of the composition of the essential oils of rosemary (*rosmarinus officinalis* l.) In the east adriatic coast

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The composition of the essential oils of rosemary from five localities along the Adriatic coast of Albania (Drač), Montenegro (Ulcinj and Krašići), and Croatia (Hvar and Rijeka) was investigated. Additional samples of essential oils of plants from Belgrade (Serbia) and Zakynthos (Greece) were included in analyses as out-groups. Oils were isolated from fresh plant

material according to the procedure reported in the Sixth European Pharmacopoeia and analyzed by GC/FID and GC/MS. Multivariate analysis was performed to identify the structure of variability (PCA) and to measure the distances between groups (CDA). The UPGMA clustering method based on Pearson distances was used to measure the similarities between each measured unit. The linear regression analysis was performed to identify the level of dependency of variation of oil composition in regard to the 19 basic bioclimatic characteristics of habitats extracted from the WorldClim set of global climate layers, using DIVA-GIS 5.2 software. The most abundant constituents of tested oils were 1,8-cineole, camphor, borneol, camphene and myrcene. Two major and one intermediate chemo-types of rosemary oil have been recorded: 1,8-cineole chemo-type (Ulcinj, Hvar, Rijeka and Zakynthos), camphor chemo-type (Krašići and Belgrade), and the third-intermediate (Drač), containing approximately equal ratios of camphor, 1,8-cineole and borneol.

PP-282

Chemical variability in *thymus pulegioides* l. Populations growing wild in the norteast of romania

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Thymus pulegioides (*Lamiaceae*) is a perennial plant widely distributed in Europe and it can be similarly used to common thyme (*Thymus vulgaris*). In the present study, we analyzed the chemical composition (volatile and polyphenolic fractions) of four *Thymus pulegioides* populations collected in two districts (Neamt, Suceava) from Northeast of Romania. Essential oils obtained by hydrodistillation from fresh aerial parts were investigated by gas chromatography/mass spectrometry (GC/MS). The chemical study of polyphenolic fraction was carried using spectrophotometric and HPLC-UV techniques. For the plants growing in Suceava district the main volatile compounds were: α-terpinolene (12.94-24.58%), E-citral (5.04-6.74 %), Z-citral (4.21-5.24 %), β-myrcene (0.73-9.57 %) and germacrene D (6.38-12.46 %), whereas the essential oils of populations from Neamt contain: carvacrol (8.69-15.22 %), E-citral (2.29-9.59 %), germacrene D (3.39-9.66 %), d-nerolidol (1.17-8.20 %), α-terpinolene (3.14-5.81 %), β-caryophyllene (4.62-5.49 %) and β-bisabolene (2.79-5.23 %) as major constituents. Apigenin, rosmarinic and chlorogenic acids were the main polyphenols identified in all populations.

PP-283

Antimicrobial activity and composition of the essential oils of *origanum* species cultivated under the good agricultural practice conditions in Turkey

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The aim of the present study was to investigate the antimicrobial activity of the essential oils from the flowering part of *Origanum onites, O. vulgare and O. majorana* by a semiquantative disc-diffusion method. The minimum inhibitory concentrations (MIC) were determined based on a micro-well dilution method against the strains of *E. coli, S. enteritidis, S. cholerasuis, P. aeruginosa, S. aureus, B. cereus, S .lutea,* and *C. albicans.*

O. onites, O. majorana and *O. vulgare* cultivated in the experimental farm of Selcuk University under the good agricultural practices (GAP) conditions and analysis of essential oils was performed by GC and GC-MS. Essential oil compositions of three species were found to be significantly different from each other. The antimicrobial activity of essential oils from *O. onites, O. majorana* and *O. vulgare* was examined against micro-organisms and the results showed in Table 1.

PP-284

A comparative study of the composition and antimicrobial activity of the oil samples of *albizzia lebbeck* (benth) l. Prepared by hydrodistillation and supercritical fluid

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Fresh flower of *Albizzia lebbeck* L. cultivated in Egypt yielded 0.18 % and 0.4 % (v/w) of essential oil prepared by hydrodistillation (HD) and supercritical CO_2 extraction (SCE) respectively. GC-FID and GC/MS analysis revealed the total identification of 44 compounds; 30 compounds (representing 80.6% of total composition) were detected in HD oil, 21 compounds (representing 99% of total composition) were identified in SCE sample and 7 components being common in both. Oxygenated compounds were 73.27 % in HD sample and 85.8% in SCE sample, while hydrocarbons were amounted to 7.33 % and 13.2 %, respectively. Both samples were found rich in esters (30.62 % and 39.94 %) respectively, mainly methyl 2-oxo-octadecanoate (26.27% in HD sample) and hexadecadienoic acid methyl ester (28.61% in SCE sample); acids were dominant in SCE sample, being 26.03% compared to HD sample (1.40 %), mainly hexadecanoic acid (15.10 and 0.38 %) respectively and octadecenoic acid (10.93 % only in SCE sample); alcohols (12.1 % and 29.39 %); aldehydes (5.55 % and 3.89 %); ethers (1.86 and 7.23 %) and ketones (0.34 % and 0.74 %) respectively. The essential oil samples prepared by HD and SCE examined for their antimicrobial activity where SCE sample exhibited a significant activity against the tested gram-positive and gram-negative bacteria, HD samples have a moderate effect and no antifungal activity against the tested fungi strains compared with Ofloxacine (antibacterial) and Amphotericine B (antifungal). The minimum inhibitory concentrations (MIC) of the essential oil were determined. As suggested by the traditional healers, the oil sample prepared by SCE was recommended to be used in skin and face care preparations for its antimicrobial effect which is correlated with high content oxygenated compounds and long chain acids and esters that were structurally similar to those present in *Aloe vera* L.

Table 1: Antimicrobial activity of *O. onites, O. majorana* and *O. vulgare* essential oils against the bacteria and fungi strains tested

Plant		*E. coli*	*S. enteritidis*	*S. cholera suis*	*P. aeruginosa*	*S. aureus*	*B.cereus*	*S.lutea*	*C.albicans*
O. onites	mm	27	29	22	13	11	24	29	28
	MIC mg/ml	31.25	62.50	31.25	125	31.25	62.50	62.50	62.50
O. majorana	mm	27	22	27	24	25	22	24	22
	MIC mg/ml	125	125	31.25	62.50	62.50	125	62.25	125
O. vulgare	mm	15	15	14	15	12	14	17	17
	MIC mg/ml	31.25	62.50	31.25	125	31.25	62.50	62.50	62.50
C*	mm	29	22	23	24	28	25	29	24
	MIC mg/ml	62.50	15.62	62.50	62.50	15.62	15.62	62.50	31.25

*C : Control; In disc diffusion assays, Gentamicin (µg/disc, Oxoid) and Nystatin (100 IU/disc, Oxoid) were used as positive control for anti-bacteria and anti-fungal actitivities, respectively. In MIC experiments, controls were as follows: Ciproflaxacin for bacteria; Amphotericin B for *C. albicans*.

PP-285

Antıoxıdant and hepatoprotectıve effects of caraway (*carum carvı* l., Apıaceae) essentıal oıl

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Caraway (*Carum carvi* L., Apiaceae) is widely used as spice, in folk medicine, pharmacy and food industry. In traditional medicine it is recommended for dyspeptic problems such as spastic conditions of the gastrointestinal tract, flatulence, fullness and loss of appetite due to its antispasmodic and antimicrobial actions. Regarding to this, antioxidant and hepatoprotective effects of chemically characterized caraway essential oil (*C. carvi* L., Apiaceae) is reported. Antioxidant activity was evaluated by measuring the free radical scavenging capacity (RSC) of examined essential oil on H_2O_2 and DPPH-radical and influence on lipid peroxidation (LP). Hepatoprotective effect involved the activity of following liver enzymes: catalase-CAT, xanthine oxidase-XOD, glutathione reductase-GSH-R, glutathione peroxidase-GSH-Px, peroxidase-Px, and content of reduced glutathione-GSH. Caraway essential oil reached 50% of neutralisation of H_2O_2 (IC_{50} <2.5 µl/ml) and was able to reduce the stable DPPH radical (IC_{50} = 4.1 µl/ml). Furthermore, it expressed strong and partly dose dependant antioxidant capacity on LP (IC_{50} <2.5 µl/ml). Examined essential oil did not produced prooxidative effect in liver despite increased Px and decreased XOD activity. However, the addition of CCl_4 after pretreatment with the essential oil significantly decreased the content of GSH and activity of CAT, while activity of GSH-Px and Px value raised.

PP-286

Extractıon of essentıal oıls from Algerıan medıcınal plants

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Algeria is one of the countries where the medicinal plants are abundant and various. The aim of this work had consisted of extraction of essential oils from *Thymus fontanesii* and *Rosmarinus officinalis* by a validated hydrodistillation method. *Rosmarinus officinalis* growing in natural habitats in Kabylia (Algeria) was obtained by hydrodistillation in 1.8 % yield and analyzed by GC and GC/MS. More than 91.23% compounds of the total oil were identified. The essential oil was taken up diethyl ether, dried over sodium sulfate, and reduced at room temperature under reduced pressure on a rotary evaporator.

The oil obtained was stored at 10°C. GC/MS analysis was performed on a HEWLETT PACKARD. More than 37 components were identified and quantified have off oil constituents one the basis retention times (RT) and farmhouse will spectra.

The main physico-chemical, organoleptic and obtained the GC-MS analysis showed that essential oils are extracted in accordance with AFNOR standards and can be used as pharmaceuticals. The main compounds of essential oil are thymol and carvacrol have power antifungal and bactericidal very important. Based on these properties, we formulated an anti-fungal ointment, anti-rheumatic and cons cold. Ointments made contain more of Thymus Fontanesii, other active ingredients and additives. The local tolerance tests were necessary given the areas recommended for the application of this ointment. All microbiological and organoleptic parameters of these formulations were determined

PP-287

Effect of organic and biological fertilizers on quantity and quality of essential oil of fennel (*foeniculum vulgare* mill.)

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In order to evaluate the effects of different organic and biological fertilizers on quantity and quality of essential oil of Fennel an experiment was conducted in a completely randomized block design with three replications. The experimental treatments were two organic (compost and vermicompost) and two biological (*Pseudomonas putida* and *Azotobacter chroococcum*) fertilizers, their all twin combinations (*Ps. putida* + *A. chroococcum, Ps. putida* + compost, *Ps. putida* + vermicompost, *A. chroococcum* + compost, *A. chroococcum* + vermicompost and compost + vermicompost) and control (without any fertilizer). There were significant differences between different treatments in terms of seed essential oil percentage, essential oil yield; anethole, fenchone,

limonene and estragole content in seed essential oil. Results showed that the highest and lowest percentage of essential oil contents were obtained in control (2.9 %) and *A. chroococcum* + vermicompost (2.2 %) treatments, receptivity. The highest essential oil yield (29.9 l/ha) and anethole content of essential oil (69.7 %) and the lowest fenchone (6.14%), limonene (4.84 %) and estragole (2.78 %) contents of essential oil were obtained in compost + vermicompost treatment. Essential oil yield and percentage of anethole content in essential oil were significantly higher in all organic and biological treatments compare with control. The highest of fenchone, limonene and estragole essential oil content were obtained in control treatment.

PP-288

Evaluating effects of essential oils from labiatae family on digestive enzyme activity of *spodoptera exigua* and *helicoverpa armigera*

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In this study, effect of leaf essential oils of *Thymus vulgaris*, *Mentha longifolia* and *Salvia officinalis* on mid gut alpha-amylase and lipase activity of *Spodoptera exigua* and *Helicoverpa armigera* was evaluated. Studied insects reared on artificial diet in controlled laboratory condition. Sixth larval instars of both insects were used for assays. Midgut of larva after dissection homogenized then centrifuged and supernatants used as enzyme sources. The essential oils of studied plants were extracted by hydrodistilation method using Clevenger apparatus. Enzyme activity and proper inhibitory activity measured using special diagnostic kits (Pars Azemon- Iran) and an auto analyzer system. This study showed that extract of *T. vulgaris* plant caused 76% inhibition of Lipase activity in *H. armigera* also P and S leaf essential oils caused 30.4 and 15.5 % inhibition respectively. The essential oils of *T. vulgaris*, *M. longifolia* and *S. officinalis* plants inhibited 16.4, 4.2 and 2.4% of lipase activity in *S. exigua,* respectively. This study also showed that alpha-amylase activity of both insects was not influenced by studied plants leaf essential oils but a minor increase in alpha amylase activity observed in presence of these essential oils.

PP-289

Chemical composition of the essential oils from foliages and seeds of ajowan (*carum copticum*) in two planting dates (spring and summer)

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The seeds (at ripening) and foliage (before flowering) of ajowan were collected from field in Isfahan province (central region of Iran), where two planting dates (spring and summer) were conducted. After drying the plant materials in shade, their essential oils were obtained by hydro-distillation. The oils were analyzed by capillary gas chromatography, using flame ionization and mass spectrometric detection.

In the spring planting date fourteen and eleven components were identified in the seed and foliage oils of ajowan respectively with thymol 44.5 % in seed and 20% in foliage as main constituent. Other components in seed and foliage oils were: γ- terpinene (26.6% and 21%), ϱ–cymene (21.6 % and 10.8 %), limonene (1.1 % and 0.3%) and carvacrol (3.6% and 0.3%) sum of these components were 94.2% and 55.7 % in the seed and foliage oils, respectively.

In the summer planting date, twelve and eleven components were identified in seed and foliage oils, respectively and the most important constituents were: thymol (55.5% and 56.2 %), γ-terpinene (22.5 % and 26.9 %), ϱ-cymene (14.2 % and 11.2 %), limonene (1.9 % and 0.5 %) and carvacrol (0.3 % and 1.4 %), respectively.

The results showed, although according to the most references, the major sources of essential oils of ajowan are seeds, but the foliage of plants had considerable amount of oil. Sum of 5 main constituents in seed oil were 94.2% and 96.2% in spring and summer planting date, respectively. The similarity of constituents of seed and foliage oil in summer was very higher than spring.

PP-290

Chemical composition and antifungal activity of the essential oil of tarragon, *artemisia dracunculus l.* (Asteraceae)

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The aim of this work was to examine the chemical composition of the essential oil of tarragon and to evaluate the activity of the oil on the growth of seven strains of Gram-positive and Gram-negative bacteria and three fungi to the Candida genus. Tarragon was collected in Iran and Turkey. Essential oil was obtained by steam distillation in a Clevenger apparatus of dried leaves of tarragon. Yield was 4.3 ml/kg. The Gas Chromatography/Mass Spectrometry (GC/MS) analyses were carried out. The major components have been found in the monoterpene fraction as trans-anethol (55 %), *cis*-allo-ocimene (16 %), *cis*-ocimene (10 %), limonene (10.8 %) and trans-ocimene (8.2 %). The *in vitro* antimicrobial activity of the essential oil of tarragon was assayed by the broth microdilution method. Results are expressed as minimal inhibitory concentration (MIC) values (μg/ml). All microorganisms were sensitive on the tarragon oil especially fungy, but *Staphylococcus aureus* and *Staphylococcus epidermidis* were not sensitive to the oil. In this study essential oil of tarragon showed good antifungal activity, while the activity against bacteria was less significant.

PP-291

Essential oil content and composition of *Thymus* spp. species grown in native and field conditions of Antalya

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The objectives of this study were to determine variability of essential oil content and composition of five oregano species (*Thymus longicaulis*. subsp. *longicaulis* var. *subisophyllus, Thymus zygioides* var. *lycaonicus, Thymus reveluoatus, Thymus sipyleus* subsp. *sipyleus* var. *davisiounus, Thymus sipyleus* subsp. *sipyleus* var. *sipyleus*) collected from the flora of Antalya. Essential oil components were determined before inflorescences, during inflorescences

and after inflorescences of species grown in wild and field conditions. They were analyzed with Gas Chromatography (GC). The highest essential oil rate were obtained from native *T. sipyleus* subsp. *sipyleus* var. *sipyleus* (5.1%) which was harvested during inflorescences and followed by field grown *T. sipyleus* subsp. *sipyleus* var. *davisiounus* (4.0%).

Eighteen compounds were identified in the essential oil of thymus species under studied conditions. In the field grown plants, Carvacrol and Linalool which are main components in thymus was found 20.10% in *T. longicaulis*. subsp. *longicaulis* var. *subisophyllus*, Thymol, 26.00% in *T. zygioides* var. *lycaonicus*, Linalool, 40.30% in *T. sipyleus* subsp. *sipyleus* var. *davisiounus*, Carvacrol 57.50% in *T. sipyleus* subsp. *sipyleus* var. *sipyleus* before inflorescences stage. In the native plants, Carvacrol was found as followed; *O. saccatum* (34.20%) before inflorescences stage, *O. majorana* (52.40%), *O. onites* (31.80%) and *O. vulgare* subsp. *hirtum* (39.50%) during inflorescences. Native *Thymus longicaulis*. subsp. *longicaulis* var. *subisophyllus, Thymus zygioides* var. *lycaonicus, Thymus sipyleus* subsp. *sipyleus* var. *davisiounu* and *Thymus sipyleus* subsp. *sipyleus* var. *sipyleus* contains carvacrol as the main component. γ-terpinen (18.60%) is a main component only in *Thymus reveluoatus* species during inflorescences. Essential oil components showed great variations within the species as well.

PP-292

Chemical composition and antioxidant activity of *Teucrium arduini* L.

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Teucrium arduini L. is a Mediterranean endemic plant with restricted range in the Western Balkans, distributed along the Adriatic Coast from the Istra Peninsula in Croatia in the north to Albania in the south. This species is a branchy, semi-woody deciduous dwarf shrub 10 to 30 cm, growing only on calcareous rocks, on rocky outcrops, and in ravines, at altitudes between 0 m and 1400 m.

This work presents the GC/MS investigation of chemical composition of essential oils obtained from aerial parts of *T. arduini* from Croatia. Hydrodistllied essential oil obtained from leaves and flowers (Sample 1) and essential oil from stems (Sample 2) show similarity in quantitative and qualitative chemical composition. More than seventy compounds were identified in both samples, representing 93.5-95.5% of total oil. Major constituents in both samples were germacrene D (23.1-29.9%), (*E*)-β-caryophyllene (12.8-16.7%). Moreover, Sample 1 contained β-bourbonene in high percentage (7.7%), while linalool (12.2%) was one of most abundant compound in the Sample 2.

In addition, the antioxidant activity of essential oil samples was tested using the DPPH radical-scavenging method. Both samples showed activity lower than thymol, which was used as a positive probe. Sample 2 showed higher activity than Sample 1, probably due to the high concentration of linalool, whish is known as potent antioxidant.

PP-293

Volatile constituents of two *acinos* species

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The aim of the present work was to investigate the content and composition of essential oils of *Acinos hungaricus* (Simonkai) Šilić and *Acinos arvensis* (Lam.) Dandy, collected from the natural habitat in Bosnia. The oil was isolated by hydrodistillation, and yield was 0.04% for *A. hungaricus,* and 0.02% for *A. arvensis*.

Volatile compounds were analyzed by coupled gas chromatography–mass spectrometry (GC–MS) technique. The major component in *A. hungaricus* oil was sclareol (63.5%), while the principal compound in *A. arvensis* oil, being in a high amount (39.2%), was not identified. This unknown compound was also detected in the essential oil from *A. hungaricus* as a second most abundant comprising 12.5% of the total oil. As additional significant constituents in *A. arvensis*, were noted sclareol (9.6%), hexadecanoic acid (9.2%), and 13-*epi*-manool oxide (6.9%).

PP-294

Chemical composition of essential oil of *allium ursinum* l.

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Allium ursinum L. (Ramsons, Wild garlic, Wood garlic, etc.) is an aromatic plant native in the Western and Central Europe. It is common in woods and shady places, often carpeting the ground in spring. Essential oil of *A. ursinum*, obtained by hydrodistillation, was subjected to capillary gas chromatography coupled to mass spectrometry. This paper presents the first report on phytochemical analysis of volatiles of this species from Bosnia and Herzegovina. Twenty-six compounds were identified, representing 83.22% of the total oil. Volatile constituents containing sulfur were the main compounds found in the oil, representing the 58.24% of the total oil, including molecular sulfur with 3.47%. Main representatives were diallyl tetrasulfide (16.65%), methyl-2-proprenyl disulfide (13.31%) and diallyl trisulfide (12.83%). Chemical analysis of essential oil of Bosnian wild garlic also showed the richness of in fatty acids and their esters, with hexadecanoic acid (12.63%), and methyl ester of 11,14,17-eicosatrienoic acid (3.70%) as the main representatives.

PP-295

Essential oil composition of *stachys anisochila* vis. Et panc. (Lamiaceae)

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Stachys anisochila Vis. et Panc. is an erect, densely deflected-hirsute perennial herb which grows on rocky calcareus places. This species is Balkan endemic, distributed in Bulgaria, Serbia and Albania. The leaves, calyx and corolla bear nonglandular and glandular trichomes. The volatile constituents of the aerial parts of *S.*

anisochila, isolated by hydrodistillation, were analyzed by GC and GC/MS. The main compounds were: *a*-pinene (7.6 %), *β*-pinene (5.28 %), *β*-bourbonene (6.25 %) and caryophyllene (4.48 %). The most abundant constituents were monoterpenes (34.02 %), followed by sesquiterpenes (23.08 %) and diterpenes (7.5 %).

PP-296

Microbial quality of mint tea (*mentha piperita* l.)

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Medicinal plants, as a basis of tea and other herbal medicines, may be contaminated with microorganisms primarily in the field, and the secondary during the harvest, collecting, unhygienic processing, transportation and long storage. Dry herbal drugs are mostly contaminated by spore forming bacteria and moulds. Microbial quality has to be coordinated with regulation of Pharmacopoeia and Regulations on microbial safety of food stuffs in trade.

Depending of level and possibilities of microbial contamination, entrance, in-process and final control of microbial quality of intermediate products and herbal remedies should be organized. Among herbal drug, the lowest microbial quality were determined for *Mentha piperita* L. Drug is mostly contaminated by moulds *Fusarium proliferatum*, *F.oxysporum*, *F.culmorim*, *F.verticillioida*, *Aspergillus flavus*, *A.niger*, *Alternaria alternata*, *Erzsiphe cichoracearim*, *Verticillium dahliae*, and bacteria, mostly by spore forming *Clostridium* sp. and *E.coli*.

Poor microbiological quality of mint is probably the result of growth in wet habitats, and part of unhygienic separation the leaves from herb and prolonged storage in inadequate conditions. As mint is very requested drug it is necessary to find adequate measures for decontamination.

PP-297

Antimicrobial activity and composition of the essential oils of *Salvia* species cultivated under the good agricultural practice conditions in turkey

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The aim of the present study was to investigate the antimicrobial activity of the essential oils from the flower part of *Salvia officinalis and S. sclerea* by a semiquantative disc-diffusion method. The minimum inhibitory concentration (MIC) were determined based on a micro-well dilution method against the strains of *E. coli, S. enteritidis, S.cholerasuis, P. aeruginosa, S. aureus, B. cereus, S .lutea, C. albicans.*

S. officinalis and *S. Sclerea* cultivated in the experimental farm of Selcuk University under the good agricultural practices conditions and analysis of essential oils was performed by GC and GC-MS. Essential oil compositions of two species were found to be significantly different from each other. The antimicrobial activity of essential oils from *E. purpurea* and *E. pallida* were examined against micro-organisms and the results showed in Table 1.

PP-298

Variation in volatile oils from fallen dried leaves and fresh leaves of *Eucalyptus* species cultivated in Nigeria

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The qualitative and quantitative evaluation of the volatile oil content of fallen, dried and fresh *Eucalyptus* leaves from three *Eucalyptus* species grown in savanna forestry reserve station, A. B. U. Zaria, Nigeria, namely *E. citriodora* Hook, *E. tereticornis* SM and *E. camaldulensis* Dehn was studied. After extraction, Gas chromatography and thin layer chromatography of the oils were carried out. Fallen dried leaves were found to contain less oil yield and less volatile components of the oil, cineole and citronellal, than the fresh leaves. The oils varied in chemical composition according to the specie from which they were derived. *E. tereticornis* was found to contain chiefly cineole, *E. camaldulensis* contained more geraniol and *E. citriodora* contained more citronellal. The source of the leaves and the specie of eucalyptus from which oils are obtained are important factors determining the quantity and quality of eucalyptus oils.

PP-299

Seed yield, yield components, essential oil and oil content of some black cumin (*Nigella sativa* l.) Populations

Table 1. Antimicrobial activity of S .officinalis and S. sclerea essential oils against the bacteria and fungi strains tested

Plant		E. coli	S. enteritidis	S. cholerasuis	P. aeruginosa	S. aureus	B. cereus	S. lutea	C. albicans
S. officinalis	mm	12	13	22	21	25	22	18	22
	MIC mg/ml	31.25	62.50	31.25	125	31.25	31.25	62.50	62.50
S .sclerea	mm	8	5	12	11	14	9	10	12
	MIC mg/ml	31.25	62.50	62.50	125	31.25	62.50	125	62.50
C*	mm	29	22	23	24	28	25	29	24
	MIC mg/ml	62.50	15.62	62.50	62.50	15.62	15.62	62.50	31.25

*C : Control; In disc diffusion assays, Gentamicin (µg/disc, Oxoid) and Nystatin (100 IU/disc, Oxoid) were used as positive control for anti-bacteria and anti-fungal actitivities, respectively. In MIC experiments, controls were as follows: Ciproflaxacin for bacteria; Amphotericin B for *C. albicans*.

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Nigella sativa L. is used in traditional medicine and for culinary preparations in many countries. Although it is an important medicinal plant, traditional and commercial uses in the world depend on wild populations. Collecting information about interrelations between seed yield components and their direct and indirect effects on seed yield, via correlation and path analyses, could serve as selection criteria and optimize breeding programs for black cumin. Eleven populations were compared for seed yield (kg/ha) yield components (biological yield per plant (g), plant height (cm), number of primary branches (pieces/plant), number of capsule (pieces/plant), capsule diameter (cm), number of seed per main capsule (pieces/capsule), seed weight per main capsule (g/capsule), number of seed per plant (pieces/plant), 100-seed weight (g), seed yield per plant (g), oil content (%) and essential oil content (%) in Central Turkey (Eskisehir) in 2009. In the trial, experimental design was randomized block design with three replications. Significant differences were found for all yield components except capsule diameter and seed weight. High significant correlations were found between seed yield and number of capsule per plant (r=0.567), and also between seed yield and number of seed per plant (r=0.515). The strongest direct effect on seed yield was number of seed *per* main capsule (1.106), number of capsule *per* plant (0.768) and biological yield (0.596). These findings will help researcher to define the selection criteria for black cumin in breeding programs.

PP-300

Essential oil composition in *achillea collina* becker ex rchb. Populations in relation to their salinity tolerance

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Achillea collina (yarrow) is a tetraploid proazulenes-containing species of the *Achillea millefolium* aggregate. The species is distributed in southeast and central Europe. In Serbia, the plant occurs on various habitats, including salt affected soils, mainly of solonetz type. The above-ground parts of yarrow are commonly used in traditional medicine. The sesquiterpenes have been considered to be mostly responsible for the pharmacological activity of plant extracts. Three populations of *A. collina* collected from different saline habitats of Serbia were studied in terms of chemical composition of essential oils and related biological interactions, i.e. their antimicrobial activity. Among the total of 79 identified components, the most presented was chamazulene (ranging from 6.3% to 13.9% in different populations), followed by sabinene, trans-caryophyllene, germacrene D, borneol and 1,8-cineol. Oxygenated monoterpene hydrocarbons (varying between 33% and 44.8%) were dominant group of the essential oil. The antimicrobial activity was expressed only against the *Staphylococcus aureus* out of five tested pathogen microorganisms. Simultaneously, a screening in salt tolerance was performed by analyses of ion and cation distribution between roots and shoots of the plant, together with measurements of general characteristics of corresponding soil samples. These investigations outlined that some halophytic taxa might be useful medicinal plant sources.

PP-301

The chemical composition of essential oils of two *teucrium l.* (Lamiaceae) from Turkey

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The chemical composition of the essential oils of dried aerial parts of two *Teucrium* L. species were analyzed by GC and GC-MS. The essential oils of those *Teucrium* species (*T. multicaule* Montbret &Aucher ex Bentham. and *T. parviflorum* Schreber) belongs to the same section *Teucrium*, were studied and twenty four and thirty two components representing 88.8% and 87.1% of the total oils were identified. The main compounds of *Teucrium multicaule* are caryophyllene oxide (32.1%) and thymol (14.6%) and in *T. parviflorum* are beta-caryophyllene (19.6%) and germacrene D (12.3%) respectively.

PP-302

Essential oil of leaves *juniperus* ssp. Natively grown in Turkey

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In this study, composition of essential oils of leaves from *Juniperus* species (*J. excelsa* Bieb., *J. foetidissima* Willd., *J. oxycedrus* L., *J. phoenicea* L., *J. sabina* Bieb., *J. communis* L. subsp. *nana*) natively grown in Turkey. The chemical composition of essential oils was obtained by Hydrodistillation method was done with a Clevenger apparatus and analyzed by GC-MS. The leaf oils were mainly composed of α-pinene, β-pinene, sabinene, myrcene, 3-carene, α-terpinene, limonene, cedrol and p-cymol.

PP-303

Composition of essential oil of *ziziphora clinopodiodies* lam. (Lamiaceae) from Turkey

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This study was designed to examine the chemical composition of the essential oil of *Ziziphora clinopodioides* Lam. (Lamiaceae) from Turkey. *Ziziphora clinopodioides* is an edible medicinal plant, which is widely distributed in Turkey. The leaves, flowers and stem of the plant are frequently used as wild vegetables or additives in food to offer aroma and flavor. *Z. clinopodioides* harvested in the Eastern part of Turkey *were* analyzed by GC and GC-MS and twenty eight compounds which accounted for 96.1% in *Z. clinopodioides*. Pulegone (32.9%), neo-menthol

(11.5%), iso-pulegone (10.1%), i*so*-menthone (8.9%) were the main components of the *Z. clinopodioides*.

PP-304

Ethno-botanical studies and documentation of medicine yielding plants of sukur people, Nigeria: A world heritage site

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Sukur Cultural Landscape is a world Heritage site listed in 1999. It is a mountainous forest which lies in the Mandara-Cameroon border highlands and covers a land area of 1888.41 hectares. Sukur people are still extant traditional society that depends largely on plants that can be classified as Medicinal and Aromatic Plant (MAP).

It is a traditional society where human living enjoys an intimate relationship with the ambient mountainous vegetation. The use of herbs for healing remedies has long been and is still part of the Sukur people. Through long use, Sukur people have built an astonishing complete knowledge of the properties of plants. Much of this knowledge on MAP, passed on orally from generation to generation in an unlettered society is in grave danger of being lost due to Sukur's new status as World Heritage Site. A proper documentation of these plants and their uses for future researchers and management plan became expedient. Ten(10) local hunters and fifty-two(52) traditional medicine practitioners were interviewed on the therapeutic value of the plants they use in health care delivery. Two hundred and eighteen (218) plants that were classified as medicinal and aromatic plants were mentioned during a 2-week interview session.

PP-305

Frequency, distribution and abundance of some important and endangered medicinal plants of Kashmir Himalayas

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Exploration trips were conducted from 2004-07 in different alpine and sub-alpine regions of Kashmir Himalayas (33°-36° N and 72°-80° E), namely Daksum Range-Kokernag (3,050 meter above mean sea level), Pahalgam (2,440 m amsl), Kulgam (1,850 m amsl) and Khudwani (1,900 m amsl) regions of district Anantnag; Chraresharief (2,200 m amsl) and Chadura (1,636 m amsl) areas of district Budgam; Sukhnai Valley (4,200 m amsl) and Lidderwas areas (4,800 m amsl) of district Srinagar to study the frequency, density and abundance of nineteen medicinal plant species. A quadrat of size 10 m x 10 m was used, which was laid randomly in selected sixty sub-locations, situated approximately 1.5 kilometers apart in all the locations. The calculated values of frequency were compared with Raunkiaer's (1934) five frequency classes. The study was focused to assess the status of some of the important medicinal plants of Kashmir Himalaya. Species like *Aconitum heterophyllum, Aconitum violaceum, Arnebia benthamii, Geranium wallichianum, Picrorhiza kurroa* and *Rheum australe* exhibited the lower pooled frequency, density and abundance values which are indicative of the fact that these species have narrow ecological amplitude, as they were present only in certain patches. However, the remaining species like *Anagalis arvensis, Cichorium intybus, Datura stramonium, Descuriania sophia, Nepeta cataria, Solanum nigrum, Taraxacum officinale, Urtica dioica* and *Verbascum thapsus*, showed comparatively a higher frequency, density and abundance values. Species falling under frequency class 'B' showed low density at Pahalgam except for *Colchicum luteum* and *Prunella vulgaris*. In *R. australe*, the density was higher at Lidderwas; may be because of the fact of inaccessibility of various tribal people as the area experiences severe cold climatic conditions which are congenial for the growth of this medicinal plant species. Among the plant species falling in frequency class 'C' from Kulgam and Khudwani (District Anantnag), Chrareshariefand Chadura (District Budgam), the highest pooled density of 4.35 plants quadrat^{-1} was shown by *S. nigrum* and the least (1.69 plants quadrat^{-1}) was recorded for *V. thapsus*. The effective measures for the conservation of the endangered medicinal plant species are discussed.

PP-306

Some aromatic plants used in Marmaris (Turkey)

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This study is a part of the master thesis "An Ethnobotanical Study in Marmaris District (Muğla)". Marmaris is located in South-West Anatolia. This study has been carried out from December 2008 to February 2010. The plants have been collected with the help of informants. The plants, which collected from Marmaris, have been deposited in ISTE (The Herbarium of the Faculty of Pharmacy of Istanbul University). Marmaris has 13 villages. In two villages, some people produce essential oils from nine aromatic plants by traditional methods. Using of essential oils are very common, some of them are used as external or internal. Elmayağı (essential oil of *Salvia fruticosa*) is most popular in this district, which is used for cold and influenza. In this poster presentation essential oils and their folk uses are shown.

PP-307

Garlic: Natural talisman of ancient civilizations till modern times

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At the time when antibiotics and other pharmacy products did not exist, a bulb of garlic itself represented a whole pharmacy industry due to the broad spectrum of effects. Most different suppositions involving this herb are mentioned; some of them were so pointless that they disappeared in time, but some of them have remained till present days. The garlic was given different names that are still in use such as "Russian penicillin", "natural antibiotic", "vegetable viagra", "plant talisman", "rustic's theriac", "snake grass" etc. In our region it is the most important preventive remedy, a universal folk spice and food, a well-trusted remedy. In the past, garlic has been utilized as a remedy during the various epidemics such as typhus, dysentery, cholera, influenza, and whenever an epidemic has emerged, garlic has been the

first preventive and curative remedy. In the ancient and middle centuries and a long time during the modern period, garlic has been appreciated as a remedy by physicians from different nations. Presentation of the development of ideas associated with garlic and the evolution of the notions increased the ability of the pharmacists and physicians to respond to the challenges of their professional services in facilitating human life.

PP-308

Introduction and identification of medicinal plants of Sepidan region in fars province (Iran)

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Historically, plants have a great importance in the development of human societies. Due to the role of medicinal plants in providing hygiene and human health it has been under the attention of human being. Because of side effects of chemical drugs and negative effects of chemical environmental pollutions on human health nowadays, the use of medicinal plants and natural products in general have a special place in drug industries and modern medicine.

Sepidan region has rich vegetation because of its 1200mm precipitation per year. Studies were carried out to collect and identify medicinal plants of Sepidan of Fars province. Plants were studied by a surveying method. After collecting, the plants were transferred to the laboratory and identification was done by library and herbaria studies. Totally 98 species of medicinal plants were identified which classified in 29 families. The most prevalent species were belong to Asteraceae, Fabaceae, Lamiaceae and Brassicaceae families. Some species such as *Lepidium* sp., *Plantago* sp. and *Ranunculus* sp. were the most frequent medicinal plants in the region. Dicotyledonous plants were the dominant species. However, native people prefer using medicinal species such as *Glycyrrhiza glabra, Descurainia Sophia, Cichorium intybus, Fumaria officinalis, Achillea milifolium, Plantago lanceolata* and *Plantago major* more than other medicinal plant species.

PP-309

The herbs which are grown in Rize area and which are used for the treatment of dermatologic disorders

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Nowadays, two treatment methods are generally used for dermatological disorders. The first one is the medicines obtained in chemical ways and these medicines have many adverse effects as well as their positive effects. Therefore, the usage area of these medicines is becoming limited day by day. The second method used for the treatment of dermatological disorders is the herbs which underlie the alternative medicine and which increasingly gain value. Many herbs are used for the treatment of dermatological disorders in the world. There are lots of herbs which may treat dermatological disorders in Turkey and these herbs are used for treatment purposes. In the present study which aimed at determining the herbs being used for the treatment of dermatological disorders and being grown in the flora of Rize, it was determined that there are 35 herbs in total; 6 trees, 6 shrubs and 1 perennial half shrub, 16 perennial, 2 two years old and 4 one year old herbs with herbaceous trunks. These herbs can be listed as follows: *Equisetum arvense* L., *Juniperus communis* L., *Chelidonium majus* L., *Viola tricolor* L., *Malva neglecta* L., *Tilia rubra* L., *Vitis vinifera* L., *Rubus idaeus* L., *Rosa damescana* L., *Rosa canina* L., *Pimpinella anisum* L., *Petroselinum sativum* L., *Achillea millefolium* L., *Anthemis nobilis* L., *Taraxacum officinale* L., *Symphytum officinale* L ., *Veronica officinalis* L., *Melissa officinalis* L., *Thymus kotschyanus* L., *Mentha longifolia* L., *Salvia divaricata* L., *Plantago lanceolata* L., *Urtica dioica* L., *Ficus carica* L., *Juglans regia* L., *Betula pendula* L., *Corylus avellana* L., *Galium verum* L., *Phoenix dactylifera* L., *Allium sativum* L., *Triticum monococcum* L., *Cynodon dactylon* L ., *Saponaria officinalis* L., *Aesculus hippocastanum* L., *Rumex patienta* L etc. In the present study, the bioecomorphological features of the herbs, their active substance content, their effectuality and use for dermatological disorders were discussed. It was observed that these herbs are preferred by experts and they are sold in the neighbourhood markets and spice stores and the local people are quite interested in these medicinal herbs.

PP-310

The herbs used as spices in Rize

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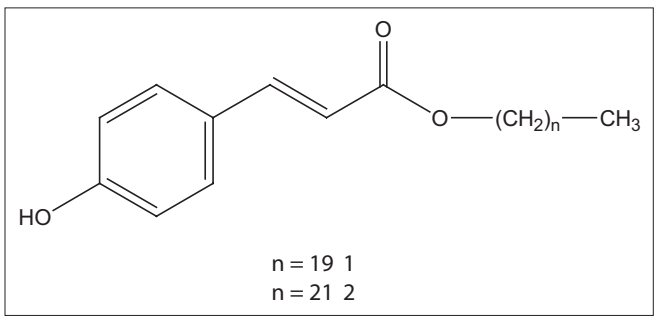
In the present study, the medicinal plants that the local people use in Rize, their area of use and benefits are discussed. There are various benefits of the medicinal plants such as preventing kidney and bladder stones, skin diseases, embolism, lip cracks, adolescent acnes, heart attacks, myloysis, psoriasis, common cold; having a positive effect on intestinal flora and reducing the risk of colon cancer. They have appetizing, stimulating and diuretic features as well. In addition the direct use of the spice products, they can also be used in several industrial branches such as food, perfumery, pharmacy and other industries. Under the current conditions, Turkey has an important place in the trade of the home products and tropical spices.

The spices found in Rize area were determined as a result of the analysis performed in neighbourhood bazaars and spice stores, observations, the information obtained from the local people and the questions of the questionnaire conducted; and the spices were divided into seven groups as follows depending on the parts used for their intakes: 1. Those made use of their roots (Ginger, curcuma), 2.Those made use of their bodies: (Fennel, parsley, cinnamon), 3. Those made use of their leaves: (Peppermint, thymus, dill), 4. Those made use of their corms



n = 19 1
n = 21 2

(Onion, garlic), 5. Those made use of their flowers (Clove, saffron), 6. Those made use of their fruits (Cumin, black pepper, chilli pepper, vanilla, sumac, coriander), and 7. Those made use of their seeds (Mustard, coconut, black cumin, greek clover) etc. It was observed that most of these herbs were sold in the neighbourhood bazaars and spice stores in Rize and the local people showed great interest in these medicinal plants.

PP-311

Ethnobotanical survey of monkshood (*Aconitum*) in the issyk-kul basin

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Among the nine Kirghiz species of the genus *Aconitum*, the tuberiferous taxa *A. soongoricum* Stapf, *A. karakolicum* Rapaics, *A. rotundifolium* Kar.& Kir., and *A. leucostomum* Vorosh. are most common in the mountains of Issyk-Kul area. Aconite tubers are commonly available at local markets in autumn and although they are very toxic and can be fatal, many peoples believe in its medical effects using alcohol extract a parboiled drug (sometimes with roots of licorice to reduce its toxicity) in a very small dose. *Aconitum leucostomum* (*burma-kara*) is the most common and the most investigated species containing mesaconitine, lappaconine, colletine and aksanitine. Although it is used sporadically as folk remedy, the raw purchase has been imposed in the Issyk-Kul basin for pharmaceutical industry. *Aconitum karakolicum* and *A. soongoricum* are known under the collective name *uu-korgoshun*. They are rich in highly advanced diterpenoid alkaloids (napelline, neoline, karakoline, aconitine, and songorine) well known also from the famous Chinese drug "fuzi" (*A. carmichaeli*), and their tubers are sold as "Issyk-Kul root", a folk remedy popular in region that decreases hepatic or nephritic griping pain and symptoms of rheumatic diseases, and that is - somewhat unpredictably - indicate to keep the stomach cancer out of activity.

PP-312

Ethnomedical study of *Thymus serpyllum* l. In central serbia

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Thymus serpyllum L. is one of the most popular and favorite national herbal remedies in Serbia, used for centuries, especially in hilly-mountain regions. The investigation included monitoring of plant distribution and presence across different meadow and pasture phytocoenoses in Central Serbia. Data about traditional and medicinal usage of Thyme were collected from local peasants, whose knowledge of medicinal plants was valuable.
For medicinal purposes, Thyme can be used as antiseptic, antispasmodic, deodorant and tonic. Tea from the leaves is good for chest ailments, cough, spasms, flu, nausea, the onset of migraine and sore throats. It can be used externally as a nerve-tonic in treating depression, colds and muscular pain, and internally for intestinal parasites and diarrhea. For culinary use, aromatic Thyme oil acts as perfect, pleasant and harmless conservans, preventing fermentation. Pastoralists use it for washing and steaming of wooden dishes for milk and cheese. Bruised leaves rubbed over a piece of meat will preserve it and give it a better flavor.

PP-313

Ethnopharmacological application of medicinal plants to cure skin diseases and in folk cosmetics among the tribal communities of north-west frontier province, pakistan

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The present investigation deals with Ethnopharmacological application of medicinal plants to cure skin diseases and in folk cosmetics by the tribal communities of North-West Frontier Province (NWFP), Pakistan. A total of 65 plant species belonging to 46 families have been recorded for their ethno pharmacological application against skin diseases and in folk cosmetics. Seventy-five medications for fifteen skin diseases and cosmetics were documented in this study. The mode of application was topical as well as oral administration. The herbal cosmetics range from face freshness, removal of ugly spots, hair care, colouring of palm, feet, gums and teeth. Most effective plant species includes: *Allium cepa, Berberis lyceum, Bergenia ciliata*, *Cedrela toona*, *Citrus limon, Cucumis sativus, Juglans regia, Lycoperiscon esculentum*, *Melia azedarach, Otostegia limbata*, *Phyla nodiflora, Prunus persica*, *Sapindus mukorossi, Zanthoxylum armatum* and *Zingiber officinale*. In this context, phytochemical screening and clinical studies are interesting jobs for the feature investigators.

PP-314

Mechanism of production of trehala manna as a natural medicine in khorasan province

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Identification of mannifer plants and determination of their provenances are necessary for economic and sustainable exploitation of natural resources. In this line, investigation on plants with general name of Globe style was carried out in Khorassan province. The method of study includes reviewing scientific references, field practices including collection of various species of *Echinops spp.*, determination of active provenances, collection of biological factor processing manna and finally both studying of biology of producer factor and production mechanisms. The results indicate the sources and factors producing Trehala manna are active in three regions in Khorasan province in Iran including Nehbandan, Sabzevar and Bardaskan cities, but there isn,t any local or national exploitation from the host plants. Also it is found that the host plant is *Echinops robustus* from family *Asteraceae* and producer insect is *Larinus onopordi* from family *Curculionidae*. This insect has only one generation during a year initiating from March-April to September-October. Further more, the manna is produced by both feeding-secretive functions of the larva in various ages processing host plant tissues and after using for its metabolic function, the surplus is secreted as manna from downer labium of insect glands. These secretions

crystallized gradually from a liquid form to solid form. Chemical analysis indicates the manna constitutes of trehalose sugar (23%), starch (6%), mucilage (15.8%), albaminoids substances(14%) and ash(4%). Therapeutic properties of this manna correlate to the active substances containing mostly mucilage, starch and sugar. The high amounts of these substances have a significant effect on diseases of respiratory system.

PP-315

About folk remedies used in the centre of Malatya (Turkey)

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Ethnobotanical researches make important contributions in the scientific evaluation of the plants today with their contents which reflect invaluable knowledge which reached today by means of transfer from generation to generation during a long period time and which was gained by means of trial and error way. Thanks to Turkey's extensive floral diversity and the many civilizations in its history, its people posses a rich store of traditional botanical knowledge. However the traditional usages are mostly seeen in the small towns and villages they could be coincide in the cities. Plants used as folk remedies in the centre of Malatya are investigated in this study. It is determined that 74 plants are being used as 93 preparations of folk remedies in the city. All the collected medicinal plants are identified and voucher specimens are deposited in the Herbarium of Inonu University, Faculty of Pharmacy (INUE). Local names, part(s) used, methods of preparation, and traditional usages of folk remedies are given. Traditional herbal remedies are mostly used for skin disorders, gastrointestinal system and respiratory diseases.

PP-316

Promising practices of medicinal plants conservation among Gond and Halba, the forest dwelling tribes of bastar, Chhattisgarh

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The present paper aims at critically examining the out comes of community based interventions on medicinal plant conservation initiated by a consortium of NGOs at Bastar and how the synergy between un-codified folk system of medicinal knowledge and codified local medicine system was streamlines. The paper also critically assesses the lessons learnt from such interventions towards reforming policy and practices in regard to community based medicinal plant conservation. The evaluation of various project components such as building on medicinal plant knowledge of local healers, village botanists programme, village Biologists workshop and developing community Biodiversity Registers validate that the use of local medicinal plant knowledge of Shamans locally known as Biogas has facilitated not only identification of rare and endangered plants but also helped workers of Forest Department in adopting these plant species for their nurseries. The project has upgraded the skill of local shamans in terms of learning the technique of herbarium preparation from village Botanists Workshop. The local Shamans utilized such knowledge in developing herbarium sheets prepared along with local school children. The participatory interventions have facilitated government officers in identification and conservation of rare, endangered and threatened plant species, regular monitoring and regeneration of community level herbal gardens, stimulation for greater involvement of shamans and bone-setters in village level development and conservation activities and developing regional agenda for conservation and sustainable use of medicinal plants.

The biological resources in the indigenous territories of Chhattisgarh consist of various natural sources of agricultural, medicinal, ecological, veterinary and cosmological potencies which ensure equilibrium between local environment and social health of the tribal communities inhabiting in the forest villages. The forest dwelling tribes interact with plant and animal diversity in a natural supportive way. The traditional community based approach to medicinal plant conservation influence the customary practices, cultural resources and local knowledge systems not only among Gond and Halba communities but also among other indigenous communities. The above cultural practices, customary and non-customary, prevalent among Gond and Halba tribes of Chhattisgarh are not only inherited territorially but also continue to evolve under influence of individual innovations and local environment. The deficiencies in careful customization of these cultural practices restrict opportunities for innovation and reproduction of these practices and hinder sustainable use of medicinal plant habitat. The circulation and reproduction of natural and social environment and local system of production are followed by these cultural practices which constitute potential substrates of local cultural resources. There is an urgent need to promote supportive policy and legislative framework from the insights and success stories of community based approach to medicinal plant knowledge and conservation.

PP-317

Studies on the medicinal plants of Ayvacik-Canakkale in Turkey

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A total of 117 taxa belonging to 42 families were collected from the Ayvacik city of Canakkale. Out of these 43 taxa were observed to be used for medicinal purposes with 54 applications. Lamiaceae dominated the list with 12 taxa followed by Asteraceae with 5 species and Malvaceae, Liliaceae, Urticaceae with 2 species eaxh year.The most commonly used taxa are *Origanum majorona*, *O. onites*, *O. vulgare* ssp. *hirtum*, *Salvia fruticosa*, *Sideritis perfoliata*, *Thymus longicaulis* ssp. *chaubardii* var. *chaubardii*, *Lavandula stoechas* ssp. s*toechas, Teucrium polium*, *Urtica dioica*, *Malva sylvestris*, *Portulaca oleracea*, *Urtica pilulifera*, *Tilia rubra* ssp. *caucasica*, *Vitex agnus-castus*, *Vitis vinifera*, *Asparagus acutifolius*, *Foeniculum vulgare*, *Juniperus oxycedrus* ssp. *oxycedrus,* and *Hypericum perforatum*. The taxa recorded here have been mostly used for the treatment of cough (18.6%), stomachache (13.4%), kidney ailments (11.6%), cold, analgesic, diüretic and hemorrhoid (9. 3%), injuries, tonic, abdominal pain, laxative and dyspepsia (6.9%).

PP-318

Introduction of some medicinal plant species

miankaleh international wetland from behshahr in islamic republic of Iran

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Miankaleh Peninsula in the north and northeast city of Behshar located north of the Caspian Sea and the East Island Ashuradeh, to the south of Gorgan gulf and wetland Miankaleh lands and the West Village Zaghmrz and finally Port fisheries and industrial areas Free Zone Amirabad behshar has been contained. Miankaleh area is estimated that 68.800 hectares of land area amounts to 18.000 hectares and wetland area formed is 50.800 hectares and the pasture state is 140 km. Temperature change in this region between 10 and 26 degrees centigrade and annual rainfall is between 600 to 700 mm. With regard to importance of medicinal plants, this study has carried out in protected area and Miankaleh wetland province in February 2007 or June 2009 for identification of medicinal plants of this area. There were various stages contained collection of locale information about medicinal plants, field and *in situ* investigations and collection of herbal samples and identification of them. Our study showed that 113 species belonging to 32 families were present. The most numbers of medicinal plants were belong to the families of Compositae, Labiatae, Rosaceae, Cyperaceae, Chenopodiaceae with 21, 10, 9, 6, 5 species, respectively. In this research customary usage of traditional medicinal species, habits, useful organs, main property and taxonomic characters of plants were determined.

PP-319

Plants used as folk medicine in Tefenni (Burdur) district

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Tefenni District located in Southwest Anatolia and being a transition region between Irano-Turanian and Mediterranean Phyto-geographical regions has a rich flora. It was the centre of different civilisations during historical times. Therefore, it is an important resource for the folk medicine.

In this study, plants used as folk medicine in Tefenni (Burdur) were investigated in detail. It was determined that 85 taxa belonging to 32 families were used as folk medicine in Tefenni. Among them, 20 taxa were cultivated plants. Detailed information of the plants was collected from informants who has different demographic fetaures mostly in the surrounding villages of Tefenni. Local names, part(s) used, methods of preparation and traditional usage of plants some of which were also used for animal diseases were recorded. All collected plant materials have been identified (1,2) and deposited in the Herbarium of Hacettepe University, Faculty of Pharmacy, Ankara, Türkiye (*HUEF*).

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PP-320

Phytochemical study of *santolina rosmarinifolia*

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The use of plants in traditional medicine is very old and experiencing a renewed interest to the public. According to the World Health Organization (WHO), nearly 6377 species of plants are used in Africa, where over 400 medicinal plants, which constitute 90% of traditional medicine. In 2004, nearly 75% of Africa's population uses plants that surround it to heal, because it has no access to medicines called modern (Pousset, 1989). In the socio-economic context of developing countries, the study of plants may lead to the achievement of adequate therapeutic responses and low prices, joining a proven scientific efficacy and optimal cultural acceptability. In this context, we chose to study a species that belongs to a genus of great importance in traditional medicine. The genus *Santolina* belongs to the *Asteraceae* family, it is native mainly in the Mediterranean and includes ten species. This work reports a study of the species *Santolina rosemarinifolia* (syn. S. virens). The phytochemical investigations made on polar and non polar extracts of aerial parts of this plant, have yielded interesting results. Several molecules have been isolated for the first time in this case by various chromatographic processes, they include phenolic derivatives type phenyl propanoide and a steroid derivative (stigmasterol). These products were characterized by spectroscopic methods of analysis 1D NMR of proton and carbon, 2D NMR (COZY H-H, J-modulated HSQC, HMBC), IR and ESI mass spectrometry.

PP-321

Volatile constituents of some liverworts growing in Turkey

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Nature is the rich source of bioactive secondary metabolites with a great variability of biological effects. The liverworts are the interesting examples of the spore forming plants with distinguish chemical diversity of the secondary metabolites and wide range of biological activities. Liverworts (Hepaticae) are estimated with ~8000 species in 380 genera and 74 families. They are considered to be oldest terrestrial plants although no strong scientific evidences have appeared in the literature. Liverworts contain a wide variety of terpenoids and aromatic compounds which elaborates the characteristic cellular oil bodies, and occasionally produce their own peculiar dimeric compounds such as bisbenzyls, dimeric isocuparens, having interesting biological activity. Recently, we focused on to work on Turkish liverworts in our studies as well as the other spore forming plants like ferns, mushrooms, mosses grows in Turkey, either their chemical constituents or biological activities. This current study is constructed on GC/MS analysis of the chemical constituents obtained from ethereal extracts of *Riccia fluitans* L. (Ricciaceae), *Porella cordaeana* (Huebener) Moore (Porellaceae), *Porella platyphylla* (L.) Pfeiff. (Porellaceae), *Corsinia coriandrina*

(Spreng.) Lindb. (Corsiniaceae), *Mannia androgyna* (L.) A. Evans (Aytoniaceae), *Reboulia hemisphaerica* (L.) Raddi (Aytoniaceae), *Plagiochasma rupestre* (J.R. Forst et G. Forst) Steph. (Aytoniaceae), *Targionia hypophylla* L. (Targioniaceae), *Conocephalum conicum* (L.) Dumort. (Conocephalaceae). The major components of the species will be given in this study.

PP-322

Determination of fatty acid compositions of *Paeonia daurica* Andrews and *P. peregrina* Mill. seeds

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The genus *Paeonia* (Paeoniaceae), known as "şakayık" in Turkish, is represented by nine species in Turkey, whereas it has twenty species throughout the world. Turkey is the most important gene center worldwide for this plant. Apart from its importance being as an ornamental plant with attractive flowers, *Paeonia* (peony) species have been also utilized as a medicinal plant. Some of the peony species in Anatolia have been consumed as tea, which has been suggested to drink against constipation and epilepsy as well as for antitussive purpose. The genus *Paeonia* is one of the most important crude drugs in Chinese traditional medicine used against atopic eczema as well as for anticoagulant, anti-inflammatory, analgesic, and sedative purposes.

In this study, following trans-methyl esterification of the seed oils obtained from *P. daurica* Andrews and *P. peregrina* Mill. using boron-trifloride, their fatty acid compositions were analyzed by gas chromatography-mass spectrometry (GC-MS). The results indicated presence of both saturated and unsaturated fatty acids in both of the oils. Accordingly, amount of linoleic acid was detected as 21.40±0.006 % and 28.95±0.006 % in *P. daurica* and *P. peregrina*, respectively, whilst they were found to contain 41.70±0.12 % and 36.95±0.003 % of linolenic acid in their seed oils, in that order. Our data illustrate that these seed oils could be considered as good sources of essential fatty acids.

PP-323

Quantitative determination of caffeine in energy drinks by reversed-phase high performance liquid chromatography

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Caffeine is naturally present in coffee and is incorporated into many non-alcoholic energy drinks. A typical energy drink can contain up to 0.320 mg/ mL of caffeine. Caffeine toxic symptoms can appear after oral ingestion of about 1 g, while the application of more than 3 g can lead to death. This work has been aimed to assess caffeine content in 13 different energy drink samples commercially available from the local market and to adapt and use the HPLC with UV/VIS detection, method proposed by Sharma *et al.*, for the determination of caffeine in energy drinks. HPLC was performed with a gradient mobile phase composed of acetronitrile and 0.1% ortho-phosphoric acid (w/v) in water, and peaks were detected at 210 nm. Degassed and diluted samples were analysed on Lichrospher 100 RP18e column (250 X 4.0mm, 5µm), at 30^0C and 1.0 mLmin^{-1} flow rate. The caffeine contents in energy drinks vary according to the type of the brand, from 0.093 mg/ mL to 0.304 mg/ mL.

Used HPLC method is simple, sensitive and accurate and can be applied for the determination of caffeine in all kinds of energy drinks and for fast routine analysis.

PP-324

Testing of dissolution properties of ivy (*hedera helix* l.) Tablets at different ph values

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The dry extract of Ivy leaves (*Hedera helix* L.) is used in many pharmaceuticals that are claimed to have mucolytic and bronchodilating properties. Ivy leaves contains a wide range of compounds such as triterpene saponines (hederacoside C is main constituent), volatile oil, polyines, steroids, phenols and flavonoids. Differences in the dissolution properties of hederacoside C from Ivy tablets at different pH values were evaluated. The dissolution tests were performed in 500 mL of artificial gastric juice pH 1.2 and phosphate buffer pH 4.5, using USP apparatus 2 (paddle), at stirring speed of 50 rpm. HPLC was performed with a gradient mobile phase composed of acetonitrile and water:acetonitrile:H_3PO_4 85% (90:10:0.5$_{v/v/v}$), and peaks were detected at 205 nm. Filtered samples are analysed on Lichrospher 100 RP18e column (125 X 4.0mm, 5µm), at 25^0C and 1.5 mLmin^{-1} flow rate. The relative difference of the percentage of hederacoside C dissolved in 30 minutes at pH 1.2 and pH 4.5, respectively, was 12.7± 4.3%.

On the basis of our *in vitro* results, it can be concluded that even small variation of pH of the gastrointestinal tract, that can be produced by many physiological causes could influence dissolution rate of Ivy tablets.

PP-325

Chemical investigation of the aerial parts of *Launaea Arborescens*

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Sesquiterpenes lactones, phenolic and flavonoids compounds found in the Compositae are remarkably in terms of their structures, properties and proposed fonctions.[1] The principal constituve found in some species of *Launaea*: e.g: *L. arborescens, L. acanthoclada* have been reported to be apigenin and luteolin folovonoids glycosides.[2]

Some few sesquiterpene lactones have been also detected in the genus *Launaea* such as lactucin, and its dihydroderivative 11β, 13-dihydrolactucin which were found in the roots of l. *mucronata*.[3] In our searching for other secondary metabolites in this genus, we investigated the endemic Algerian plant *Launaea arborescens* belonging to the tribe Lactuceae of the Asteraceae family.

The chloroform extract of the aerial parts was separated by repeated silica gel column chromatography to give two naturals

pure compounds: lignane lactone **1** and the taraxast-20-ene-3β,30-diol 2. These two compounds are detected here for the first time in this genus**.**

The structures elucidation are followed by exploitation of the ^{1}HNMR, ^{13}CNMR, and ^{2}D NMR (COSY, HMBC, HSQC) spectroscopic methods as well as by the mass spectroscopy.

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PP-326

Biosynthesis of gold nanoparticles by *geranium robertianum* extract

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The biosynthesis of gold nanoparticles (AuNPs) by the reduction of $AuCl_4^-$ ions with *Geranium Robertarium* extract is a straightforward green method. Apart from the obvious environmental advantages, the phytochemical agents in tea extracts can act as reducing and capping agents, allowing in principle a much higher biocompatibility, crucial for the application of AuNPs on biological labeling, drug delivery systems and disease treatment.[1] In this work, the effect of extract concentration, time and temperature of reaction, on the the size and shape of the AuNPs, was evaluated. The characterization of the nanoparticles was performed by UV-Vis-IR spectroscopy, TEM-EDS (transmission electron microscopy- energy dispersive spectroscopy), XRD (X-Ray Diffraction). It has been observed that for the formation of nanoparticles minimum concentration of extract is required and, as the extract concentration increases, the nanoparticles appear sooner and the absorbance peak occurs at lower wavelengths – between 560 and 530nm. At higher extract concentration a new broad absorption in the NIR region, is observed, and the peak in the visible wavelengths is no longer symmetrical. Since smaller particles absorb at lower wavelengths and anisotropic particles (triangles or rods) absorb towards NIR-region (near-infra-red),[2] these data suggest the presence of large triangles and hexagons as well as a predominance of smaller NPs for higher concentration of extract. These results were confirmed by TEM images were 100-200nm triangles and hexagons were observed as well as spherical AuNPs with diameters ranging from 10-20 nm. According to the XRD spectra, the crystalline growth occurs preferably through the plane {111} typical of the gold face-centered cube structure.

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PP-327

Phenolic content and antioxidant activity of apple (*malus pumila*) juices and their by-products

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The apple juice industry produces important amounts of waste as fruit residues mainly pulp, core, peel, seeds and stems. These by-products form the apple pomace which represents about 30% of the initial fruit[1]. Apple pomace extracts have shown antioxidant properties attributed to their phenolic content[2]. The objectives of the presented work was to compare the phenolic content and the DPPH radical scavenging activity of apple juices from the cultivar Gala and Granny with the content and activity of their by-products extracts.

Gala and Granny apples were bought locally, washed and pressed using a domestic juice extractor. The juices, foams and pomaces were immediately frozen at 80°C then freeze-dried. Pressurised solvent extraction and microwave assisted extraction of the foams and pomaces were compared. All juices and extracts were analysed by HPLC-UV-DEDL and HPTLC. Anisaldehyde-sulfuric acid and DPPH solutions were used as visualising reagents.

Comparison of the HPLC profiles indicated similar composition of the Gala and Granny apple juices. However the relative amounts of the major compounds were different. The UV spectra of those major compounds suggested mainly catechin derivatives and phenolic acids. HPTLC analyses allowed detection of terpenoids in the foams and pomaces extracts.

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PP-328

Phytoecdysteroids of genera *serratula* and *rhaponticum* of the east asia

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The species of *Serratula* and *Rhaponticum* (fam. *Asteraceae*) are employed as tonic and adaptogenic remedies in traditional medicine of different countries. Their chemical composition did not explain these effects until ecdysteroids were found. When studying the flora of East Asia for ecdysteroids content, we chose as perspective sources for ecdysteroids the plants *Serratula manshurica* Kitag., *S. centauroides* L., *S. komarovii* Iljin, *Rhaponticum satzyperovii* Soskov, *Rh. uniflorum* (L.) DC., *Rh. carthamoides* (Willd.) Iljin. We determined the content of ecdysteroids (20-hydroxyecdysone, integristerone A, 2-deoxy-20-hydroxyecdysone, a-ecdysone) in different organs of the plants, its dependence from phases of development. It turned out that the maximum of ecdysterone content was in green mass for young plants of wildgrowing species of genus *Serratula*. For the species of genus *Rhaponticum* the maximum of ecdysterone content was found in leaves and roots. *Serratula manshurica*

(ecdysterone ≈ 1.8%) and *Rhaponticum uniflorum* (ecdysterone ≈ 1.5%) have been chosen as the most perspective sources for ecdysteroids from the flora of Far East Russia. As we had sufficient quantities of phytoecdysteroids of various structure, we investigated their biological activity that may have a role in practical sense. Antimicrobial activity and toxic effect for *Drosophila melanogaster* Meig. of ecdysterone were established.

PP-329

Estimation of podophyllotoxin and podophyllotoxin in *Podophyllum hexandrum* royle. Using high performance liquid chromatography technique

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Podophyllum hexandrum Royle. is a rhizomatous, herbaceous, perennial and endangered medicinal plant of Kashmir Himalayas. The rhizomes and roots contain podophyllotoxin, which is used for the synthesis of drugs for the treatment of lung and testicular cancer, neuroblastoma, hepatoma and other tumours. High performance liquid chromatography method was used for the estimation of podophyllotoxin, podophyllotoxin glucoside and dimethyl podophyllotoxin glucoside in the rhizomes of four morphovariants of *P. hexandrum*. HPLC of *P. hexandrum* was performed using methanol- water as mobile phase and the components were detected at 290 nm using PDA detector. Analysis revealed maximum percentage (13.72) of podophyllotoxin in plants with one leaf and minimum (0.922) in plants with 4 leaves. Podophyllotoxin glucoside content also showed variation among 1-4 leaved plants; with the maximum quantity (3.683 %) in two leaved ones and the least (0.216 %) in plants with three leaves. Dimethyl podophyllotoxin glucoside was present below detection limit. The calibration curves for different active principles were linear. The HPLC analysis for the amount of podophyllotoxin, podophyllotoxin glucoside and dimethyl podophyllotoxin glucoside in the rhizomes of four leaved plants of *P. hexandrum* has been reported for the first time from Kashmir Himalaya. The HPLC method used here for the quantification of podophyllotoxin, podophyllotoxin glucoside and dimethyl-podophyllotoxin glucoside in *P. hexandrum* is simple, sensitive, rapid, cost-effective, accurate and easily adaptable technique for quantitative estimation of these active ingredients.

PP-330

High performance liquid chromatographic estimation of Picroside-I and Picroside–II in *picrorhiza kurroa*, an endangered medicinal plant species of Kashmir Himalaya

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Picrorhiza kurroa Royle ex Benth (Scrophulariaceae) is a small creeping herbaceous alpine species, used by local and tribal people for curing fever, asthma, jaundice, stomach ache, indigestion, common fever and bronchial asthma.It has now an endangered status as it is being ruthlessly harvested from the wild source due to its high demand in the pharmaceutical Industry. In the present investigation exploration trips were carried out in various alpine and sub-alpine areas of Kashmir Himalaya (33°-36° N and 72°-80° E) namely Pahalgam (2,440 meter above sea level), Daksum Range-Kokernag (3,050 m asl), Sukhnai Valley, (4,200 m amsl) and Lidderwas-Sonamarg (4,800m asl) to collect its samples for carrying out HPLC analysis, to study its population dynamics and cytogenetics. The HPLC analysis revealed higher content of picroside-1 (5.652 %) in plants collected from Lidderwas-Sonamarg population and a lower (4.164 %) in the plants collected form Daksum Range-Kokernag. However, reverse was true for picroside-II. Percentage of picroside-II was more than the corresponding level of picroside-I at both the locations. The species was sporadically distributed in the form of patches, each comprising of about 68 to 291 individuals and within patches the plants were mostly present in small clumps of about 10- 20 individuals per clump. Density of the species was higher (4.26 plants quadrat^{-1}) in Lidderwas-Sonamarg, followed by Sukhnai Valley (2.33 plants quadrat^{-1}), Daksum Range –Kokernag (2.25 plants quadrat^{-1}) and the least (16.0 plants quadrat^{-1}) at Pahalgam. Maximum and minimum abundance values of 28.44 and 9.60 were recorded in Lidderwas-Sonamarg and Pahalgam areas, respectively. The frequency of the species was higher (18.33% frequency) in Daksum Range-Kokernag compared to Sukhnai Valley (10.0%).

PP-331

Heavy metal and nutrient elements profile of *sideritis dichotoma* huter, an endemic species from Turkey

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Sideritis species are widely used as folk medicine and herbal tea in Turkey for years. *Sideritis dichotoma* Huter (*Labiatae*) is an endemic species growing in north and northwest Turkey. In recent years, there has been growing worldwide interest in monitoring heavy metals and macro- and micronutrients in medicinal and aromatic plants. In this study, heavy metal and selected nutrient elements (Al, Cd, Co, Ni, Cr, P, S, K, Ca, Cu, Fe, Mn, B and Zn) content in *Sideritis dichotoma* Huter samples collected from Sorgun Plain (Karabük) in north-western Turkey was monitored. The quantitative measurements were carried out with inductively-coupled plasma (ICP-OES). The contents of heavy metals were found as; 0.014 mg kg^{-1} for cadmium, 0.25 mg kg^{-1} for cobalt, 0.82 mg kg^{-1} for chrome, 1.11 mg kg^{-1} for nickel and 532 mg kg^{-1} for aluminum. The macronutrients Ca, K, P and S were found to be 1.04, 1.52, 0.16, and 0.14%, respectively. On the other hand, the concentrations of micronutrients boron, copper, iron, manganese and zinc were recorded as 14, 8.27, 405, 41, and 21%, respectively.

PP-332

High performance liquid chromatographic analysis of rosmarinic acid in *rosmarinus officinalis l., Salvia officinalis l., Satureja cuneifolia l.* And *satureja montana l.* Extracts

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In this study, using HPLC-ED system, analysis of rosmarinic acid was carried out in hot extracts of rosemary, sage, *Satureja cuneifolia* L. *and Satureja montana* L. Hot extracts of leaves were prepared. The drug was powdered and extracted with water. Afterward 1 ml of that extract was centrifuged. Supernatant was used for analysis. A standard solution rosmarinic acid (RA) was used. HPLC conditions were following: Mobil phase methanol-acetonitrile-HPLC water-acetic acid (20+10+70+1); ED detector with range 50 nA, potential +0.840 V, filter 0.02 Hz; flow rate 1ml/min; temperature 25 °C. Determination of RA was based on a comparison of retention-times of standard solution of RA and retention time of RA obtained from extracts. The amount of RA in extraction was: rosemary leaves 8.35 mg/g, sage leaves 4.37 mg/g, *Satureja cuneifolia* 5.65 mg/g and *Satureja montana* 3.71 mg/g.
The presence of RA in high concentrations gives more importance to rosemary, sage and both examined *Satureja* as potential medicinal plants. Main pharmacological activities of RA are astringent, antioxidative, antiinflammatory, antimutagen, antibacterial and antiviral.

PP-333

GC-MS investigation of alkaloids in *Galanthus rizehensis*

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Galanthus L. (Amaryllidaceae) is a genus of bulbous monocotyledons, which grow naturally in Europa, Anatolia and the Middle East (1). The alkaloids of the family Amaryllidaceae are shown to possess interesting pharmacological properties (2). *Galanthus rizehensis* Stern, used in the present study, was collected from Macka (Trabzon) in 2007 during both the flowering and fruiting periods of the plant.
In this study, we report the identification of twenty-one alkaloids in four different extracts of *G. rizehensis,* by capillary gas chromatography/mass spectrometry (GC-MS). Extract solutions were injected into the GC-MS in splitless mode. The GC-MS spectra were recorded on a Hewlett Packard 6890 equipped with a MSD 5975. The mass spectra were deconvoluted by AMDIS (NIST, Gaithersburg, MD, USA) software. The alkaloids were identified by comparing their mass spectral fragmentation and retention time with standard reference spectra from NIST 05 database (NIST Mass Spectral Database, PC Version 5.0 (2005), National Institue of Standardisation and Technology, Gaithersburg, MD, USA) or with reference compounds which are previously isolated from several Amaryllidaceae plants.

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PP-334

Oleanane-type triterpenoids from *panax stipuleanatus* and their cytotoxic acitivity

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Ten oleanane-type triterpenoids, calendulaglycoside C (1), pseudoginsenoside RT_1 methyl ester (2), pseudoginsenoside RT_1 (3), stipuleanoside R_2 (4), araloside A methyl ester (5), 3-*O*-*β*-D-glucopyranosyl (1→2)-*β*-D-glucuronyl-28-*O*-*β*-D-glucopyranosyl oleanolic acid methyl ester (6), 3-*O*-*β*-D-xylopyranosyl (1→2)-*β*-D-glucopyr-anosyl-28-*O*-*β*-D-glucopyranosyl oleanolic acid (7), chikusetsusaponin a (8), spinasaponin A methyl ester (9), and pesudoginsenoside RP_1 methyl ester (10) were isolated from the methanol extract of the rhizomes of *Panax stipuleanatus*. This is first report on the isolation of spinasaponin A methyl ester (9) from a natural source. All compounds were isolated from this plant for the first time. Cytotoxic activities of these compounds were evaluated with HL-60 (leukemia) and HCT-116 (colon) cancer cell lines. Compound 10 exhibited significant cytotoxicity against two human cancer cells.

PP-335

Effects of rameb complexation on aqueus solubility of glycyrrhetic acid from *glycyrrhiza glabra* l. Electron microscopic characterisation of stable complex

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Glycyrrhiza glabra L. (licorice) roots are rich in triterpenoid saponins and flavonoids. Glycyrrhizin is the representative saponin for this species. Its aglycone glycyrrhetic acid (GA) is responsible for numerous pharmacological effects of this natural product. However, GA has the disadvantage of poor water solubility. The first purpose of this study was to explore the use of cyclodextrins in order to overcome solubility and bioavailability problems of GA. RAMEB was chosen from a group of four cyclodextrins (HPGCD, GCD, HPBCD, RAMEB) due to the favorable stability constant (377.9) of the inclusion complex formed with GA. Phase solubility studies showed complexation of GA/RAMEB at molar ratio 1:1, displaying an A_L type solubility curve. The second purpose of this study was to assess the stability of the GA/RAMEB complex. Investigations with Differential Scanning Calorimetry (DSC) allowed observation of GA melting peak at 295°C, while no other exothermic or endothermic changes occurred until melting. For the GA/RAMEB complex, a higher melting point was indicated. Investigation with Scanning Electron Microscopy (SEM) revealed a clear difference in the morphology

of the inclusion complex, when compared to native GA and RAMEB cyclodextrin, confirming the stability of the complex.

PP-336

Irradiation effects on phenolic content and scavanger ability of some medicinal herbs formulations note I: fructus of *Rosa canina l.*

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The effect of medium doses of γ-irradiation (0.3-15.5 kGy) on total phenolic content was investigated for rose hip dry extract, rose hip granulated extract and rose hip powder tablets.
Screening for antioxidant ability was performed using DPPH method.
The biocide effects were investigated and positive results were evidentiated at 2.3-4.2 kGy/min doses. Total scavenger activity of granules and tablets were substantial increased after 6 kGy/min doses of γ-irradiation applied.
The same level of gamma irradiation provoked significant decreases in scavenger activity of simple rose hip extract, probably due to formation of free radicals.
IR spectra confirm the changes in chemical structure.

PP-337

Comparison of content of alliin, diallyl disulfide, reduced glutathione and l-cysteine in leaves and bulbs of garlic and ramson

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In this study was analysed the content of alliin, reduced glutathione (GSH), L-cysteine and diallyl disulfide (DD) in leaves and bulbs of garlic and ramson at the end of their vegetative period. It was performed HPLC with fluorescence FLD, UV-VIS and ECD detector. Three columns were used: Nucleosil C-18, Hypersil ODS and Lichrosorb RP-18. Also, four different mobile phases were used. The concentration of L-cysteine is significantlly higher in ramson bulb than garlic, but L-cysteine is higher in garlic leaves. The content of GSH in garlic bulb is slightly higher than in ramsons. GSH is higher in garlic leaves than in ramson. Much higher concentration of DD was found in garlic bulb. DD in leaves of garlic and ramsons was in trace. Concentration of alliin is significantly higher in ramson bulb than garlic, but alliin in garlic leaves is higher than in ramson. HPLC with different detection systems seems to be very powerfull technique and can be used for analyses of different biological samples and food.

PP-338

Utilisation of hplc with electrochemical, fluorescence and uv detectors for analysis of sulphur compounds in garlic, and wild garlic

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The main goal of this study was the optimization of determination of alliin, diallyl disulfide (DD), reduced glutathione (GSH), L-cysteine in garlic and wild garlic and using HPLC with electrochemical (ED), fluorescence (FLD), and UV spectrophotometric (UVD) detectors. Alliin was determined following pre-column derivatization. Determination of isoindole was performed on Nucleosil C-18. Mobile phase phosphate buffer, pH=7.15: tetrahydrofurane : 1.4 dioxane : acetonitrile was used. Potential was +750 mV for ED; excitation: 230 nm and emission: 420 nm for FLD. For separation of GSH and L-cysteine Hypersil ODS column was used. As a mobile phase 0.015 M o-phosphoric acid, pH=3 was used for UVD. Detector settings: 205 nm for UVD and +680 mV for ED. Column used for separation of sulfides was Lichrosorb RP-18. Acetonitrile : water : tetrahydrofurane was used as a mobile phase. Detector setting: 240 nm for UVD. Different results were obtained, comparing same method for two tipes of detector for alliin, GSH and L-cysteine analysis due to different selectivity and specificity of detectors. Concentration that could be analysed: alliin (FLD: <1.27 ng; ED: <0.566 μg), GSH (UVD and ED: <6 μg), L-cysteine (UVD and ED: <28 μg) DD (UVD: <2.9 mg).

PP-339

Selenium in wild-growing medicinal plants: results of a survey on fifty-six species from Western Romania

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Selenium is a rare nonmetal element, essential for higher animals and man. It is an active constituent of over twenty different selenoproteins observed in human tissues. Additionally, Se is a potent anticarcinogen, inhibiting both chemically and virally induced tumors. The ever-increasing biological importance of this trace element determined us to perform the first large-scale investigation of Romanian medicinal plants in what their Se content is concerned, and to evaluate the extraction ratio of this element during decoction. ICP-MS (Inductively Coupled Plasma - Mass Spectrometry) analysis revealed average Se contents of 43 μg/kg dry matter. The highest Se content was found in aerial parts (average of 60 μg/kg), followed by leaves (58), roots (54), flowers (35) and fruits (12). Species grown on limestone weathering soils are significantly richer in Se than the ones grown on granite or phyllite. Outstanding Se contents were measured for samples of *Betula pendula* leaves – 381, 131 and 113 μg Se/kg, *Agrimonia eupatoria* herb - 332 μg/kg, and *Galium verum* herb – 287 μg/kg. The extraction ratio of Se through decoction ranges from 5.6% (valerian root) to 80% (horsetail herb). The relatively high Se contents as well as consistent amounts of flavonoids from birch, agrimony and yellow bedstraw underline the value of these plants in the auxiliary treatment of various free-radical mediated diseases.

PP-340

The quantitative effects of temperature and light intensity on growth of St. John's Wort (*Hypericum perforatum* L.)

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In this study, it was aimed to define the relationships between temperature, light intensity and growth parameters for St. John's wort (*Hypericum perforatum* L.) namely net assimilation rate, relative growth rate, leaf weight ratio, leaf area ratio and specific leaf area. Changes in plant growth caused by the effects of environmental conditions such as temperature and light intensity were intended to be described by plant growth models. All equations produced for growth parameters were derived as affected by light intensity and/or temperature. As a result of multi-regression analysis, it was found that there was close relationship between actual and predicted growth parameters. The regression coefficients (R^2) of the produced equations for growth parameters changed from R^2=0.92 (leaf weight ratio) to R^2=0.97 (leaf area ratio).

PP-341

The chemical variability of some natural populations of *polygala sp.* From north-east romania

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In Romania, the *Polygala* (milkwort) species are known for their etnopharmaceutical uses regarding their stomachic, eupeptic, carminative and digestive tonic action.
Eight natural *Polygala major* Jacq. populations and three *Polygala comosa* Schkuhr. (tufted milkwort) ones, were harvested in June 2009, in two north-eastern Romanian counties (Moldavian Subcarpathians). The populations were morphologically and biochemically investigated (average plant length/mm and average weight/plant/g) in order to quantitatively and qualitatively evaluate the vegetal raw material, processed by specialized companies. We evaluated their content of flavonoids, polyphenolic acids, triterpens and phytosterols, to appreciate their inter- and intraspecific chemical variability. Using TLC as a qualitative investigation technique, we resorted to spectrophotometry coupled with HPLC for the quantitative determination of the absolute methanolic extracts, to compare the spectrum similarities and differences in the group of polyphenolic compounds.
The study showed the existence of an intraspecific variability for the populations belonging to the same genre (variability given by the local pedoclimatic conditions). We noticed that the polyphenolic fraction is made up, in both species, of the major compound rutoside and of some apigenol derivates. We also noticed the existence of a quantitative intraspecific variability between *Polygala major* and *Polygala comosa* referring to the polyphenolic compounds.

PP-342

Determination of rutin in various medicinal plants from bosnia

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In this study, using HPLC-ED system, quantification of rutin was carried out in different extracts of medicinal plants. Analyses of rutin were performed on the leaves and flowers of ruta, buckwheat, rose, sage, calendula mariogold, chamomile, elder, dandelion, feverfew, lemon balm, linden, thyme, valerian, stinging nettle, cloves, dog rose, pansy, parsley, cowslip, rose e.t.c. Rutin was extracted with hot water. Supernatant was used for analyses. The standard solution was rutin. HPLC conditions: Mobile phase methanol-acetonitrile-HPLC water-acetic acid (20+10+70+1); Potential: +0.840 V; Flow rate 0.8 ml/min; Column: ODS hypersil. Determination of rutin was based on a comparison of retention time obtained from standard solution of rutin and retention time obtained from rutin in plant extracts. Content of rutin (mg/g) was highest in the leaves of ruta (86.0) and follow flowers of buckwheat (53.5), the leaves from buckwheat (20.0), flowers of pansy (33.5) and flowers of rose (10.0). In all other plants the content of rutin was lower than 5.0 mg/g. The high concentration of rutin in flowers and leaves of ruta, buckwheat, pansy and rose give more importance to ruta, buckwheat, pansy and rose as medicinal and diet plants for theirs use to decreasing of capillary fragility.

PP-343

Total sulfur content of ramsons and garlic plant organs in the late spring period

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Aim of this study was to analyzed total sulfur content in garlic and ramsons in the late spring period at the and of ramsons vegetation period and the period of the height metabolic activity of garlic, in temperate climates, also estimate a use of ramsons and garlic leaves in the same period as a remedy for cardiovascular diseases, regarding a values of total sulfur parameter. Quantity of total sulfur was being measured using the ion chromatography, in the form of sulfate ion, with the sample first being treated in a strong oxidizing media using mixture of perchloric and nitric acid. Sulfur level for two species of garlic was higher in the leaves than in the bulbs. Distinction is more expressed for spring-garlic and in leaf was found 30% more of total sulfur (1.1mg/g) than in bulb (0.7 mg/g). For fall-garlic distinction between bulb (0.63 mg/g) and leaf (0.66 mg/g) is not significant. Results for ramsons are reverse and in bulb (0.93 mg/g) was found about 20% more values of total sulfur than in the leaf (0.74 mg/g). Results of analysis recommended consumption of ramsons at early spring period, because level of sulfur compounds for leaves is the highest, also recommended both herbs as a significant pharmacological source of organo-sulfur compounds.

PP-344

Phytochemical studies on the aerial parts of *vitex agnus-castus* l.

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Vitex agnus-castus L. (Verbenaceae), Chaste tree is deciduous shrub that is native to Mediterrenean, Europe and Asia. The fruit extract of this plant has been used in the treatment of premenstrual syndrome with moderate to severe complaints.

Volatile oils of the air-dried aerial parts of *Vitex agnus-castus* L. collected from Antalya (two districts namely Aksu and Phaselis) were obtained by steam distillation and analysed by GC/MS. The main components of the volatile oil were found as α-pinene, 1,8-sineol, sabinene, β-caryophyllene, α-terpinyl acetate, spathulenol and germacrene-B. Although the same compounds were present in two volatile oils, the volatile oil obtained from Phaselis sample differed from the other sample. In the oil of Phaselis sample, germacrene B was not found but 1,8-cineole identified at higher percentage. Two district chemotypes (a germacrene B chemotype) could be identified in *Vitex agnus-castus* L. collected from Aksu and Phaselis. All these results were compared with literature data and showed the presence of a new chemotype not described before.

Besides, the methanolic extracts of the aerial parts of *Vitex agnus-castus* L. samples were analyzed by LC/MS for their phenolic compounds. The methanolic extracts of the samples have been found to be remarkably rich in casticin as flavonoids.

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PP-345

Bioactive compounds from centaurea species

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The species of the genus *Centaurea*, made the object of many phytochemical investigations which showed their wealth of bioactive secondary metabolites in particular flavonoids.[1] and sesquiterpene lactones.[2,3] As part of our ongoing program of research on plant of this genus,[4,5] we report our results on *C. parviflora* Desf. growing in Algeria.

Our studies, which concerned the isolation and the structural elucidation of secondary metabolites from the aqueous-EtOH extracts of this plant, led to the determination in the native state of 13 compounds: eupatorin 1; eupatilin 2; cirsilineol 3; jaceosidin 4; 5-hydroxy-6,7,3',4'-tétramethoxyflavone 5; genkwanin 6; 7, 4'-dihydroxy-5-méthoxyflavone 7; cnicin 8; an acylated cnicin derivative 9, nicotiflorin 10; 3- (4- *O*- β- *D*- glucopyranosyl-3,5- dimethoxy)- phenyl- 2 E-propenol 11; ethane *O*-α-*D*-arabinofuranoside 12; cornicinin 13.

The structures of these compounds were established by the combination of their spectroscopic data, notably the analysis of UV, RMN-^{1}H, RMN-^{13}C, DEPT, HSQC, NOESY, HMBC spectra as well as by ESIMS.

In the best of our knowledge the compound 13 is new for all the reign plant. It is also important to note that the compound 12 is not described in the literature.

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PP-346

Benzophenones and flavonoids from *hypericum maculatum* crantz

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Three known benzophenones – annulatophenonoside, acetylannulatophenonoside, annulatophenone and the flavonoid O-glycoside guajaverin were isolated for the first time from the aerial parts of *Hypericum maculatum* Crantz. In addition, hyperoside, isoquercitrin and miquelianin were isolated from this plant, as well. The structures of the benzophenones and the flavonoids were established by chemical and physical techniques. The compounds isolated from *H. maculatum* were analyzed for radical scavenging and antioxidant activities using DPPH-, ABTS-free radicals, total antioxidant activity (FRAP assay) and inhibition of lipid peroxidation in linoleic acid system by the ferric thiocyanate (FTC) method. Butylated hydroxytoluene (BHT) and ascorbic acid were used as positive controls. Isoquercitrin demonstrates the highest DPPH-radical scavenging (96.6 ± 0.3%), FRAP-activities (23.8 ± 0.2 TE/mol) and antioxidant activities in linoleic acid system. Guajaverin and acetylannulatophenonoside show significantly strong ABTS-radical scavenging activity (93.9 ± 0.4% and 93.4 ± 0.6%, respectively) comparable to activity of the ascorbic acid (96.2 ± 0.4%).

PP-347

Compositional changes of health beneficial compounds of two carob types *(Ceratonia siliqua l.)* During fruit ripening

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The present study reports the composition of two types of carob pods (*Ceratonia siliqua*) sampled during one period of harvesting from South of Greece. The moisture content was determined by lyophilization, sugars by HPLC, and total polyphenols by UV/VIS and fatty acids by GC in the fleshy and wild types at three stages of maturity. The moisture content was 78.4 percent at the start in the wild type and 75.4 percent in the fleshy type, but these values decreased to 9.4 and 9.1 percent in the last stage respectively. The polyphenol content was 22.5 and 21.5 percent in the wild and fleshy types, and decreased to 3.8 and 1.8 percent in the 3rd stage. Principal sugars are glucose (13.6-8.5 % in the

wild, 12.3-9.7% in the fleshy type), fructose (10.3-3.3 % in the wild, 6.3-2.8% in the fleshy type), and sucrose (21.4-2.0 % in the wild, 33.3-5.1% in the fleshy type). An analysis of the two types of carob pods revealed that these contain 16 saturated and unsaturated fatty acids, the major one being linoleic acid ranging between 33.22-9.42 percent in the wild type and 42.23-11.56 percent in the fleshy type followed by oleic, palmitic and then linolenic fatty acids. In general the moisture, glucose, linoleic and α-linolenic acid contents show a decrease during the fruit ripening while oleic acid content increases from 21.54 to 40.48 percent in the wild type, and 13.63-38.45 percent in the fleshy type.

PP-348

Coumarins from the roots of *cleme viscosa* (l.): Antimicrobial and their cytotoxic activity

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Two coumarins, 7-geranyloxycoumarin (auraptene) and 6'-hydroxy-β-cycloauraptene were isolated from roots of *Cleme viscosa* (Capparidaceae). The second compound has never been reported from this plant before. The isolation process involved extraction with various solvents and separation using column chromatography techniques. The structure of the compounds were assigned on the basis of spectroscopic data Such as IR, UV, ^{1}H-NMR, ^{13}C-NMR, COSY, HMQC, HMBC, DEPT, MS and on comparison with published data. However, bioactivity screening showed that the pure isolated compounds possessed no activity on two species of bacteria *Bacillus cereus* NRRLUI-1447 and *Pseudomonas aeruginosa* UI-60690, and four species of fungi (*Aspergillus ochraceus* NRRL 398, *Candida lipolytica* ATCC 2075, *Saccharomyces cereviseae* NRRL 2034 and *Saccharomyces lipolytica*). The cytotoxic test of the compounds against CEM-SS (T-cell lymphoblastic leukemia) cells were also carried out with IC_{50} values >30μg/ml.

PP-349

Chemical composition of *frankenia thymifolia* desf

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Secondary metabolites constitute an important reservoir of compounds with interesting biological and therapeutic properties. In fact, the pharmaceutical industry has for a long time used vegetal origin compounds.

In this perspective, our laboratory undertook a research program, intended to promote the local flora, particularly the one of the Aurès and the North-Saharan regions aiming for a possible discovery of new active compounds.

Our work describes the phytochemical study of the species *Frankenia thymifolia* Desf. (Frankeniaceae) [1,2]. Our objective is motivated by the fact that this species has not been chemically studied before. The only phytochemical investigations made on the genus *Frankenia* led to the identification of sulfate flavonoids and phenolic compounds [3-5]. The exploitation of the ethyl acetate extract of the roots of *F. thymifolia* allowed us to isolate by chromatographic methods four pure compounds, three of which are originals: a sulfate lignane and two aromatic compounds.

Structures of isolated compounds were established by one and two dimensional homo and heteronuclear NMR experiments and by mass spectrometry.

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PP-350

Determination of chlorogenic acid in some fruits using high performance liquid chromatography with electrochemical detection

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In this study, using HPLC-ED system, analysis of chlorogenic acid CGA was carried out in blueberry, red currant, bilberry, cherry and wild cherry fruits extracts. The fruit (1g) was homogenised and extracted with water (9 ml). Afterward 1ml of that extract was centrifuged. Supernatants were used for analysis. The standard solution of CGA was used. HPLC conditions were following: Mobile phase: EDTA (0.372 g), sodium acetate (8.2 g), acetic acid (7.9 ml), methanol 50 % (63.3 ml) and water up to 1 L; ED detector with range 50 nA, potential +0.750 V, filter 0.02 Hz; flow rate 0.9 ml/min; temperature 25°C. Determination of CGA was based on a comparison of retention-times of standard solution of CGA and retention time of CGA obtained from fruits extracts. The contents of CGA in blueberry was 37 μg/g; red currant 4 μg/g; bilberry 3 μg/g; cherry 0.2 μg/g. CGA in unripe wild cherry was 1 μg/g, and semiripe was 0.5 μg/g. The content of CGA in ripe wild cherry was below limit of detection by this method.

The concentrations of CGA were higher in unripe fruits. Content of CGA in fruits extract can be use as biomarker of ripeness of fruits.

PP-351

Variation of hypericin content in natural populations of *hypericum maculatum* crantz growing in levocske mountains (slovakia) regarding developmental stages and management regimes

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The aim of the work was to determine the content of hypericin in dried *Hyperici herba* during the five different developmental stages (vegetative stage, stage of closed green buds, beginning of blooming, stage with fully opened flowers and stage of brown capsules) in *Hypericum maculatum* CRANTZ growing wild in Levocske Mountains in Slovakia. The plant material was collected from five mountain meadows under two different management regimes (with management and no management). Dried *Hyperici herba* was extracted to methanol and the content of diantron derivates was determined by the spectrophotometric method (Ph. Eur. 4) and expressed as hypericin. Hypericin content increased

with advancing of the stages (0.0854 – 0.196 %) and rapidly decreased in brown capsules (0.0224 – 0.0434 %). The maximum hypericin content was recorded during the stage with fully opened flowers (0.161 – 0.196 %) which is principally regarded as the appropriate harvesting time. Although the average values of hypericin are higher in plant material collected from meadows with management (grazing and moving), results of t-test showed that it is not possible at this stage of the experiment to state the significance of the management regimes and more samples will need to be analysed during the next vegetation period.

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PP-352

Total content of phenols in some fruits using different extracting solvents

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Subject of this study was the determination of total content of phenols (TP) in eleven fruits from Bosnia (dog rose fruits, apple, pomegranate pit, chestnut, pomegranate juice, pear, medlar, and wild pear, fruits of service tree, quince and wild apple. The main goal was to estimate efficiency of extraction of phenolics using four extracting solvents with different polarity. The TP was estimated by spectrophotometric method. The supernatants were used for analysis. **a)** Cold water extraction: It was found the highest TP in dog rose fruits, and follow apple, pomegranate pit, chestnut, pomegranate juice, pear, medlar, wild pear, fruits of service tree, quince and wild apple. **b)** Hot water extraction: The highest TP was found in dog rose fruits, but the lowest in pear. **c)** Extraction in cold aqueous solution of 10 % formic acid and methanol in proportion 1:9 (OS): The highest content of TP was found in dog rose fruits, but the lowest in pear. **d)** Hot OS: The highest content of TP was found in dog rose fruits, but the lowest in pomegranate juice.

Extraction with hot OS was more successful than the extraction using another solvents. Dog rose fruits had the highest TP.

PP-353

Composition of alkaloid spectrum in *papaver somniferum* (l). And *papaver bracteatum* (lindl.)

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Alkaloids are nitrogenous organic substances of alkalic character, which form as aminoacids metabolism products in plants. They usually exist in the form of carboxylic acids salts. Mostly there are mixtures of alkaloids in plants, not only one alkaloid. Composition of this alkaloids mixture is dependent on the part of plant, from which it is obtained and on vegetation period. In poppy plants, there are so called isochinoline alkaloids of morphinane type (morphine, codein, thebaine) and benzylisochinoline type (papaverine, reticuline). The aim of this experiment was to monitor an influence of year (2008 and 2009) on alkaloids content in 5 selected cultivars with different content of morphine (Mieszko, Zeno 2002, Major, Lazur and Buddha) and in *Papaver bracteatum* Lindl.

Samples analysis was performed in Research Institute of Medicinal Plants (GYNKI) in Budakalász, Hungary by using HPLC method, which principle is in separation of individual components (alkaloids) between mobile and stationary phase. HPLC equipment used was Agilent Technologies 1100, column Eurospher 100 c18e 5µm; 120 x 4 mm (Knauer). Morphine content, which is in the most part influenced by genetical base of cultivars showed in all cultivars in the both years the same trend. Higher morphine yields in comparison with previous year were reached in 2009, i.e. in cultivars Zeno 2002, Lazur and Buddha. Other alkaloids were more or less influenced by external factors and their contents in individual years varied. Higher variability in content of these substances in comparison with morphine content, which is cultivar´s trait and must be stable, is probably caused by the fact, that these substances exist in plants as intermediates of morphine metabolism and their content is less stable and influenced by environmental conditions. Similar as in morphine, higher contents of other monitored alkaloids were also measured in 2009. The highest content has codein, which was identified in all analysed cultivars. Measured amount was between 0.01 – 0.1 %. Other alkaloid is oripavin, which was also identified in all cultivars, monitored average amount was between 0.01 – 0.02 %, only in cultivar Lazur we found higher amount (0.1 %) in 2009. Other alkaloid was thebaine. Its importance and future is in lesser possibility of misuse for drugs production, in comparison with e.g. morphine. The highest content was in cultivar Lazur 0.06 – 0.08 %, and in other cultivars it did not exceed 0.02 %.

The results of chromatographic analysis of poppy straw in *Papaver bracteatum* Lindl. showed, that prevailing alkaloid is thebaine with content of 2.5 – 2.7 %, higher content was also in 2009. The second identified alkaloid was narcotoline in amount of 0.1 – 0.2 %, which showed opposite trend and had higher content in 2008. Other monitored alkaloids were not identified at all (morphine, narcotine, papaverine) or in centesimal amount (codein, oripavine).

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PP-354

Determination of arbutin in extracts *of arctostaphylos uva ursi l., Vaccinium vitis-idaea* l. And *vaccinium macrocarpon* ait. Using high pressure liquid chromatography with electrochemical detection

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In this study, using HPLC-ED system, analysis of arbutin was carried out in different plant extracts. Hot and cold extracts of leaves and fruits were prepared. The drug was powdered and extracted with water. Afterward extract was centrifuged. Supernatant was used for analysis. A standard solution of arbutin was used. HPLC conditions: Mobil phase: EDTA (0.372g), sodium acetate (8.2 g), acetic acid (7.9 ml), methanol 50 % (63.3 ml) and water up to 1L; ED detector with range 50 nA, potential +0.750 V; flow rate 0.9 ml/min. Determination of arbutin was based on a comparison of retention-times of standard solution of arbutin and retention time of arbutin obtained from extracts. The amount of arbutin in mg/g with cold extraction was: bearberry leaves 10.36; lingonberry leaves 26.72 and lingonberry fruits 0.28; cranberry leaves 0.24 and cranberry fruits 0.03. The amount of arbutin in mg/g with hot extraction was: bearberry 3.5, cranberry leaves 11.46 and cranberry leaves 0.16. The contents of arbutin in fruits of lingonberry and cranberry were below limit of detection by this method. All examined plants contain arbutin that fights infection, soothes irritation and reduced inflammation during urination. Uroantiseptic arbutin give more importance to examined fruits as potential natural drugs.

PP-355

Measurement of salicylic acid in poplar's bark (*P. Deltoides* and *P. Euramerican*) by high performance liquid chromatography

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The family Salicaceae includes *Salix* and *Populus* species. This family especially *Salix alba* is very important in ancient medicinal. Recognition and investigation on other species in this family can help to development of herbal medical in country. This study was done to measuring of salicylic acid in *Populus deltoides* and *Populus euramerican*. After collection and drying of barks, extraction was done according to TAPPI standard (T204 om-88) by using acetone, ethanol and water solutions. Measuring of salicylic acid was done by HPLC (High Performance Liquid Chromatography).

The extractive material yields of *P. deltoides* and *P. euramerican*s barks were obtained 12.2 and 17.7%, respectively, based on dry weight of the barks. HPLC analysis showed that there are 32 compounds in water extractive materials which amount of two compounds are more than others. According to retention time one of two compounds is salicylic acid. The percent of salicylic acid in *P. deltoides P. euramerican* barks are 0.016 and 0.021 respectively. Generally, this research shows that *Populus* species have salicylic acid which is lower than *Salix alba*. The amount of salicylic acid in *P. euramerican* is more than *P. deltoides*. Hydrophobic compounds in *P. euramerican* are twice than *P. deltoides*. There is no significant difference between hydrophilic compounds of two species.

PP-356

Measurement of gallic acid in poplar's bark (*P. Deltoides and P. Euramerican*) by high performance liquid chromatography

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Vegetable hydrolysable tannins are derivatives of gallic acid. Gallic acid is simple phenolic compound which has three hydroxyl group and one carboxyl group on a benzene ring. Usually phenolic compounds are glucosides and soluble in water. The aims of this research are to evaluate gallic acid in water soluble extractive materials of *Populus deltoides* and *Populus euramerican* and also calculated the extractive materials yield in two species. After collection and drying of barks, extraction was done according to TAPPI standard (T204 om-88) by using acetone, ethanol and water solutions. Measuring of gallic acid was done by HPLC (High Performance Liquid Chromatography).

The extractive material yields of *P. deltoides* and *P. euramericans* barks were obtained 12.2 and 17.7 % (based on dry weight of the barks), respectively. Acetone soluble materials in *P. euramerican* are twice of P. deltoides. HPLC analysis show that there are 15 and 12 compounds in water extractive materials of *P. deltoides* and *P. euramerican* barks, respectively, which amount of four compound are major. According to retention time, one of that is gallic acid. The amount of gallic acid in *P. deltoides* and *P. euramerican* barks are 336 and 760 mlgr (based on one kg), respectively.

Generally, water soluble extractive materials yield in *P. deltoides* and *P. euramerican* obtained 7 and 8 %, respectively, which the gallic acid content in water soluble extractive of *P. deltoides* and *P. euramerican* are 0.5 and 1 %, respectively.

PP-357

Extraction and analysis of the compounds from the plants of ginger family (*Zingiberaceae*): A quick review

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Zingiberaceae is the largest and most extensive family of the plants, which includes such plants as cinnamon, ginger and turmeric whose spices are used in food industry and also as natural sources for pharmaceutical products. These plants can be consumed as is or in the form of powder/extract. Current literature data published on the plants of Zingiberaceae family were studied and the most appropriate extraction and analysis methods were identified. Antimicrobial and antioxidative properties of the extracts from these plants on certain fungi and bacteria have been proven. Distillation, scratch, solvent extraction, enzyme-assisted extraction and supercritical fluid extraction are among the most applied methods considered to extract the volatile compounds from the plants of this family. Also, different methods are evaluated for the analysis of the extracted compounds. High performance liquid chromatography (HPLC) and gas chromatography (GC) are among the reported analytical approaches for such purposes.

PP-358

Extraction, analysis and application of volatile compounds from genus *allium* (alliaceae family): A review

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Allium is the most important and largest genus of Alliaceae family. Volatile sulfur compounds present in this family have

antimicrobial, remedial and other applications in the industry. Because of their sensitivity to the processing conditions, these compounds may easily change into other compounds and lose their functional properties. In this review, after introducing some of the compounds obtained from the plants of this genus, the most applicable methods of analysis and extraction of them are investigated. Also, effect of different processes on the variation of sulfur-containing compounds will be discussed. It was found that methods with high efficiencies that also work at low temperature are most suited for the extraction of these compounds. Therefore, application of supercritical fluid extraction (SFE) or enzymatic methods is suggested for the extraction and fractionation of sulfur-containing compounds from these plants. In cases where the whole plant is prescribed for consumption, prevalent processes (such as the regular cooking processes) do not have considerable negative impact on these compounds and they only change from one form to another without losing their functional properties. HPLC and GC-MS at low temperature were identified as the most appropriate methods of analysis for these compounds.

PP-359

Analysis of some components extracted from Urginea *Maritima growing* in the north of Algeria

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The aim of this work had been consisted of extraction, analysis and characterization of some heterosides from the *Scilla (Urginea Maritima)* which is growing in the middle north of Algeria (Kabylia). The dried powder had been submitted then to toxicological and bactericidal analysis.

It had been choosen the following solvents: water; mixture EtOH-water (80 : 20v/v)], MeOH-water (80 : 20v/v), EtOH (8 spots), MeOH (10 spots), acetone (10 spots).

For the TLC, we used Silicagel 60 $F_{254+366}$ Merck plates, chloroform/ methanol/dimethylformamide (80 :19 :1, v/v/v) as mobile phase and Carr-Price reagent under 366 nm. The HPLC analysis had been led under the following conditions: JASCO PU 1580 with JASCO UV-1570 (UV/VIS Detector); Discovery C_{18} (250mmX4.6mm, 5µm column); acetonitrile / water (30 :70, v/v), rate: 0,7 ml/min. λ= 280 nm.

Test results of acute toxicity are shown in the Table 1 and in Figure1.

PP-360

Qualitative analysis of phenolcarbonic acids in seeds *Nigella sativa* growing in Uzbekistan

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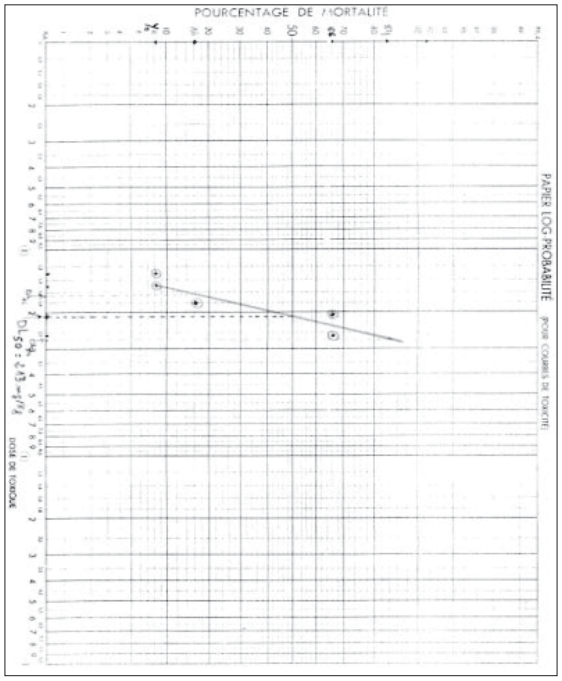
Researches of a chemical compound and pharmacological properties of medicinal vegetative raw material, total phytopreparation and the individual substances allocated from plants, result in creation of new highly effective medical products and open new sources of their reception. *Nigella sativa* it is characterized by a rich chemical compound, that is why a wide biological spectrum of action.

We have studied of structure phenol carbonic acids of seeds *Nigella sativa*, growing in Uzbekistan. Qualitative definition phenol carbonic acids carried out methods paper (systems - «N-butanol-acetic acid - water (4:1:5) and «15 % a solution of an acetic acid») and thin layer chromatography's (system isopropyl spirit ammonia - water (8:1:1) with use for display of specific reactants (pair of ammonia, 10 % a solution of sodium hydroxyl in alcoholic, 1 % alcoholic solution of aluminum of chloride). Components defined on characteristic fluorescence in UV - light before processing chromogen reactants and comparison R_f of the found out substances and authentic images. Phenol carbonic acids found out on bright - blue, greenish-blue, violet fluorescence. Thus it is established, that phenol acids the structure of an investigated plant is submitted not less, than two substances, which as a result of comparison to authentic samples of "witnesses" are identified as gallic (R_f 0,41) and oxybenzoic (R_f 0,54) acids. For detailed studying componential structure of phenol connections used a method of highly effective liquid chromatography (HPLC). Research (USA) with the subsequent computer processing the received data (the standard program «3D Chem Station») carried out on highly effective chromatograph «Agilent 1100 series» firms «Agilent Technologies». Detecting carried out with help UV-of the detector at length of a wave of 254 nanometers on it is inverted - a phase column in the size 2,5 x 150мм, filled silicagel

Table 1: Test results of acute toxicity

Doses mg/Kg	Number of deaths				Symptoms
	24 h	48 h	72h	totale	
125.3	0	0	0	0	No phenomena of intoxication
150.4	0	0	0	0	Weakness
180.4	0	0	1	1	Convulsions
216.5	2	0	1	4	Tono-clonic convulsions, ataxia. tremors
260	3	0	1	4	



with the size of particles 5 microns with imparted octadesil groups ODS S-18, at room temperature. As a mobile phase used a mix metanol-50 m mol/l a solution of the phosphatic buffer (pH 3), graded changing from parity 20:80 till 75:25. Speed of submission of eluent made 0.5 ml / mines, duration of the analysis of-25 minutes. In chromatograph entered on 20 mkl researched extraction and solutions of standard samples.
Identification of substances on chromatogram's researched extraction *N. sativa* carried out by comparison of time of their keeping to from time to time keeping standard samples.
Thus, as a result of the carried out researches it has been revealed, that in seeds *N. sativa* contain such phenol carbonic acids as: vanilla, p-oxybenzoic, gallic, veratric, anisic, lilac acids. With help HPLS it was possible not only to confirm qualitative structure of the phenol connections established earlier by a method of a paper chromatography, but also considerably to expand it.

PP-361

An investigation of bioactive compounds in *Crataegus* species

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The ability of plant phenolics, present in Hawthorn, to act as free radical scavengers has lead to huge interest in their ability to act as antioxidants *in vivo*. Polyphenolic compounds, commonly present in Hawthorn, along with crude herbal preparations of Hawthorn Leaf and Flower, and Hawthorn Berry, were examined using the TEAC and DPPH assays to determine antioxidant activity. Initial results have shown that the standards can inhibit up to 90% of free radicals, Infusions of Hawthorn Leaf and Flower have been found to be almost as effective with 85% of free radicals being inhibited, while decoctions of Hawthorn Berry have been shown to be less effective with 50-60% of free radicals being inhibited. Most Hawthorn preparations are consumed orally however, and while the *in vitro* antioxidant results are promising, the effect of gastro-intestinal conditions on the ability of phenolic compounds to scavenge free radicals, is not taken into account. Simulated gastro-intestinal conditions were set up and the standards and crude herbal preparations were exposed to these conditions to determine their effect, if any, on antioxidant activity. Preliminary results are indicating that the scavenging activity of Hawthorn phenolics may be reduced by as much as 50% following exposure to simulated gastro-intestinal conditions.

PP-362

Isoflavones from *genistella sagitallis* and *genista tinctoria* extracts

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In order to find new sources of antioxidant phytoestrogens were analyzed the isoflavons from the *Genistella sagittalis* and *Genista tinctoria* extracts. The qualitative and quantitative analyses were performed by LC/MS. The hydroalcoholic extracts were obtained by sonication in 10 minutes at 60 °C. The studied extracts were found rich in free isoflavons: daidzein, genistein, formononetin and their 7-O- glucosides: daidzin, genistin, ononin.

	Daidzin	Genistin	Ononin	Daidzein	Genistein	Formononetin
Sample	mg/ml	mg/ml	ng/ml	mg/ml	mg/ml	ng/ml
Genistella sagittalis	2.89	51.60	890.20	0.55	9.02	839.50
Genista tinctoria	22.32	130.17	242.70	8.81	73.77	675.70

The isoflavones are known having significant antioxidant activity. The antioxidant activity of studied extracts was evaluated using ORAC assay. This assay evaluates the antioxidant activity of isoflavones among to the other polyphenols and other components with antioxidant capacity. ORAC assay showed 2829.8 ± 202.9 mM Trolox Equivalents/ g DW for *Genistella sagittalis* extract and 2724.9 ± 70.92 mM Trolox Equivalents/ g DW for *Genista tinctoria* extract. The results show that the studied extracts have significant antioxidant activity.

PP-363

Authentication of extracum formulations obtained from market

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The present research work compares each ingredient present in the various marketed formulations with authentic plant drugs procured from the market with the help of HPTLC. Three formulations for Extracum were obtained. The ingredients of each formulation were authenticated with the individual drugs obtained from the market. Extracum formulation contains extract of Asparagus racemosus. HPLC method for each ingredient was standardized and authenticated. Analysis of MXMAN was performed on TLC aluminum plates pre-coated with silica gel 60F-254 as the stationary phase, with mobile phase consisting of Chloroform: methanol: Water (8:2:0.5) at room temperature (25±2 ◦C). Camag TLC scanner III was used for spectrodensitometric scanning and spots were derivatized by using Anisaldehyde reagent. The ingredients of formulation were authenticated with the individual drugs obtained from the market. HPTLC method for each ingredient was standardized and authenticated. The estimation and photo documentation was done by I- Dista method.

PP-364

2-Phenoxychromone from *Artemisia tournefortiana* rchb.

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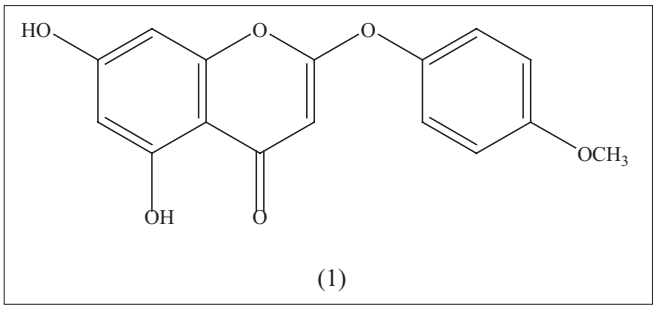
We have isolated before the sesquiterpene lactone tourneforine[1] of the eudesmane type from the aerial part of *Artemisia tournefortiana* Rchb. During the research of the polar part of the extract, we isolated the crystal substance with melting point 232-234 °C.
The structure of molecule (1) was determined on the basis of



(1)

the data obtained by complex of spectral methods (NMR ^{1}H, ^{13}C, 2D NMR ^{13}C-^{1}H (COLOC), and also mass-spectra with high-resolution) and confirmed by X-ray analysis. The metabolite has been isolated before from *Artemisia capillaries*.[2] and *Artemisia rupestris*.[3] This substance - 6-demethoxy-4´-O-methylcapillarisin (5,7-dihydroxy-2-(4-methoxyphenoxy)-4H-chromen-4-one) was isolated from *Artemisia tournefortiana* for the first time.

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PP-365

Development and validation on hptlc method for determination of diosgenin in bulk drug, herbal extract and tablet dosage form

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Diosgenin is a sterolic saponin of furastrol type and this are known for hypocholesterolemiant action. The present work describes a simple, precise and accurate HPTLC method appropriate for estimation as bulk, extract and tablet dosage form. The analyte was obtained by original extraction method with hydrolysis and applied on HPTLC silica gel 60 plates, in band with LINOMAT 4 sample applicator (CAMAG).

Linear ascending development was carried out in twin trough glass chamber 20x10 (CAMAG) satured with mobil phase consisting of petroleum ether: acetone (30:7.5 v/v); The plate was then dried and sprayed with sulphuric acid 10% v/v in methanol reagent. Densitometric evaluation of spots was carried out at 441 nm using Camag TLC Scanner-3 with win CAT 1.3.4 version software. The system was found to give compact spots for diosgenin (R_f value of 0.62±0.01), obtained for samples and for diogenin (s.r. Fluka). The linear regression analysis data for the calibration plot showed good linear relationship with r=0.9761 in the concentration range 2-4 μg with respect to peak aria.

The accuracy and reliability of the proposed method was ascertained by evaluating various validation parameters like linearity (40-200 ng/spot), precision (intra-day RSD 0.43-0.71 %, inter-day RSD 0.43-1.27 %), accuracy (98.72±0.20) and specificity according to ICH guidelines.

PP-366

Crocetins and crocin assessment of gamma irradiated of saffron (*Crocus sativus*) with reversed phase high performance liquid chromatograohy

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Saffron is an important spice of high economic value. Used as a dye is great interest to all concerned with the study and use of spices and medicinal plants.

Traditional manually processing and packaging will prepare the best condition. Applying the irradiation technique with recommended doses (2, 4 and 6 kGy) will keep its quality and cleans it up to standard conditions. Parallel to radiation processing, we have controlled saffron natural dyes; crocetins and crocin as the best markers of its chemical specification for color and flavor. Methods have been developed for the determination of the quality of the saffron using high-performance liquid chromatography (HPLC) system in gradient mode with a reversed phase (Nova pack C18) column, UV detector (max of 420nm) and elution buffer of methanol-acetic acid mixture is applied for this assay. Solid phase extraction cartridges (Sep-Pak) are used for pre-treatment of the extracted dyes of saffron.

PP-367

Determining some botanical and chemical properties of *onosma mutabilis* boiss., An endemic plant species in Turkey

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Onosma species are belonging to the family *Boraginaceae*, order *Lamiales* and subclass *Dicotyledoneae*. The genus of *Onosma* is represented approximately 102 taxa (with 97 species) in Turkey and the rate of endemism among the native species is about 50 %. *Onosma* has nearly 50 endemic species and 1 endemic variety in Turkey. An important member of this genus, *Onosma mutabilis* Boiss has been used as folk medicine, herbs and dyes for centuries. *Onosma mutabilis*, an endemic plant in Turkey, naturally grows around Nemrut Mountain located in Southeastern part of Turkey and famous with its rich genetic plant resources. In this study, seeds of *O. mutabilis* were collected from the Nemrut Mountain, Adıyaman on the July 5th, 2009, (1860 m, N 37^{0} 58', E 038^{0} 43'). After cleaning, ripening seeds were used for chemical analysis. Besides some morphological properties, grain weight (38.37 g), seed fatty oil content (% 19,09) and fatty acid composition of the seeds were determined.

PP-368

Determination of arbutin in some fruits using high performance liquid chromatography with electrochemical detection

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In this study, using HPLC-ED system, analysis of arbutin was carried out in blueberry, red currant, bilberry, cherry and wild

cherry fruits extracts. The fruit (1 g) was homogenised and extracted with water (9 ml). Afterward 1ml of that extract was centrifuged. Supernatants were used for analysis. The standard solution of arbutin was used. HPLC conditions were following: Mobile phase: EDTA (0.372 g), sodium acetate (8.2 g), acetic acid (7.9 ml), methanol 50 % (63.3 ml) and water up to 1 L; ED detector with range 50 nA, potential +0.750 V, filter 0.02 Hz; flow rate 0.9 ml/min; temperature 25 °C. Determination of arbutin was based on a comparison of retention-times of standard solution of arbutin and retention time of arbutin obtained from fruit extracts. The contents of arbutin in blueberry was 21 μg/g; red currant 26 μg/g; bilberry 63 μg/g and cherry 20 μg/g. Arbutin in unripe wild cherry was 30 μg/g. The content of arbutin in ripe and semiripe wild cherry was below limit of detection by this method.

All examined fruits contain arbutin that fights infection, soothes irritation and reduced inflammation during urination. The presence of arbutin, give more importance to examined fruits as potential natural drugs against infections.

PP-369

Comparing content of alkaloids in endemic species of *ephedra* genus grown in khorasan deserts

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Alkaloids are defined as organic components, which are delivered from plants. Ephedrine and Pseudo-ephedrine are the main alkamines that were extracted from *Ephedra senica* in China, firstly. This research was carried out in order to identifying amount of alkaloids existed in endemic species of *Ephedra* in Khorasan province. Total alkaloids were analyzed by GC and GC-MS. Results showed that *Ephedra major* grown under ecological conditions of north Khorasan with 0.9% alkaloids content, is the highest level from view of ephedrine content, comparing the other dominant species. Other species such as *Ephedra intermedia*, *Ephedra strobilaceae*, *Ephedra foliate* grown south deserts of Khorasan, contains 0.8, 0.5 & 0.5 percent alkaloids, respectively. So, it is recommended industrial extraction and commercial production of ephedrine by cultivating and domesticating of *Ephedra major* species on farmlands which is located the same situation from view of weather north Khorasan.

PP-370

External and vacuolar flavonoids of *Anthemis austriaca* Jacq.

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The genus *Anthemis* L. (*Asteraceae*) comprises about 210 species and 9 of them are present in the flora of Serbia. *Anthemis austriaca* Jacq. is an annual or biennial herb, which belongs to the subgenus *Cota*, section *Cota*. In this work we have analysed surface (lipophilic, external) and vacuolar (internal, polar) flavonoids of involucral bracts, leaves, ray and disc florets of *A. austriaca* by HPLC. The flowering aerial parts of *A. austriaca* were collected near Belgrade (Serbia), in June 2005 and in June 2006. Lipophilic flavonoids were extracted from the surface of involucral bracts, leaves, disc and ray florets separately, by briefly dipping the whole tissue in acetone. After removal of the surface flavonoids, the vacuolar flavonoids were extracted with 80% methanol.

The acetone extracts of different parts of *A. austriaca* contained 10 flavonoid aglycones, 8 flavones and 2 flavonols. The major lipophilic constituents in all tissues were eupatorin, 6-hydroxy luteolin 6,4'-dimethyl ether, an apigenin derivative and a luteolin derivative. The disc florets also contained quercetin in prominent amounts. Regarding the distribution of aglycones in different tissues it was observed that quercetin and isorhamnetin were detected only in the extracts of disc florets and that apigenin was chemical character of the ray florets. The methanol extracts of different tissues of *A. austriaca* were dominated by different vacuolar flavonoids; rutin was the major flavonoid of involucral bracts, rutin and quercetin 3-*O*-glucoside of the leaves, apigenin glycosides of the ray florets and patuletin 7-*O*-glucoside of the disc florets.

PP-371

Alkaloids from *narcissus serotinus*

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The Amaryllidaceae botanical family is well known for the presence of an exclusive group of alkaloids with a wide range of biological activities.[1] *Narcissus serotinus* is a plant belonging to this family and its geographical distribution is mainly located along the Mediterranean coast. In the present work, specimens collected near Casablanca (Morocco) were used to study the alkaloid content of this specie. Starting with just 350 mg of the whole plant we used typical extraction and purification procedures to obtain fractions and compounds ready to analyze by GC/MS (Gas Chromatography/Mass Spectrometry) and NMR techniques. The preliminary results revealed the presence of lycorine and homolycorine type alkaloids. Some of the isolated compounds correspond to new alkaloids, one of which has been previously published, but with an erroneous structure.[2]

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PP-372

Determination of phenolic compounds of some mosses from Turkey

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Bryophytes, phylogenetically placed between vascular plants

and algae, are very interesting group in botany; few studies have been realized on the chemistry, especially molecular level. In this study, the total phenolic contents and compositions of phenolic acids were examined in ethyl acetate extracts of *Fontinalis antipyretica* Hedw., *Hypnum cupressiforme* Hedw., *Hypnum imponens* Hedw. and *Philonotis calcarea* (Bruch & Schimp.) Schimp. Total phenolic contents were spectrophotometrically determined by Folin-Ciocalteu assay and their amounts were in the range of 57.33±1.10 to 94.41±1.84 mg g^{-1} dry extract in equivalent of gallic acid. For the determination of phenolic acids, HPLC analysis was performed by utilizing two solvents system [A: methanol:water:formic acid (10:88:2; *v:v:v*); B: methanol:water:formic acid (90:8:2; *v:v:v*)] on a C_{18} column. The flow-rate and injection volume were 1 ml min^{-1} and 10 µL, respectively. Signals were detected at 280 nm. Besides, internal standard technique (propylparaben) was applied for the analysis of phenolic acids to increase the precision (1). Protocatechuic acid was the main phenolic compound in *H. imponens* and *H. cupressiforme*, whereas vanillic acid was the principal phenolic compound in *F. antipyretica* and *P. calcarea*. The other phenolic acids detected from the extracts were *tr*-cinnamic, ferulic, *o*-coumaric and *p*-hydroxybenzoic acids.

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PP-373

Trace of heavy metals (cobalt and cromium) in leaves of aquatic plant *Avecinnia marina* of nayband mangrove forest in boushehr province, Persian Gulf, Iran

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Mangroves are plants which live between the sea and the land. A mangrove is not a species, but rather the name given to a community of unrelated plants living in areas which are inundated by tides. These plants have been used in traditional medicine for centuries. Heavy metals are known to pose a potential threat to terrestrial and aquatic biota. However, little is known on the toxic levels of heavy metals found in mangrove plants that are used in traditional medicine. Because of its exceptional situation, the Nayband mangrove of Boushehr province in the Persian Gulf has become the site of many plants and gas refineries and these aquatic plants are directly and indirectly being polluted by mineral and organic materials. The present study was done on the medicinal plant leaves of *Avecinni amarina* in order to measure and study the distribution of heavy metals (cobalt and chromium) due to regional pollution. In this paper, we present the results of our studies on the two parts of plant (top and bottom leaves) of pollution absorbed from a station (6 sampling points) on December of 2008. Measurement was performed based on commonly used standards methods, using an atomic absorption spectrometer (AAS), with the use of prepared standards to determine sample concentrations. The detailed statistical analysis of data compared with those obtained in some other mangrove forest in the Persian Gulf and other countries will be presented. Metal concentrations in leaves were tested using One-Way ANOVA. Statistically significant differences between groups were assessed using LSD multiple comparison test. The average concentration of Co and Cr was (2/4-4/3mg/g) in the *Avecinni amarina leaves* samples.

PP-374

A novel α-(1→4) - d-glucan isolated from the fruits *opuntia ficus Indica* (l.)

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A neutral polysaccharide, named as PS-1, was isolated from fruits Opuntia *ficus indica* (L.) was found to contain a D-glucan. Methylation, Smith degradation, acetolysis, NMR spectroscopy (^1H, ^{13}C, ^{13}C–^1H 2D-COSY) and acid hydrolysis studies were conducted to elucidate its structure. The results indicated that the D-glucan consisted of a backbone composed of (1→4)-D-glucosyl residues and carried a single (1→6)-linked D-glucosyl residue.

α-D-glucosidic linkages were present in the polysaccharide according to I.R. and NMR spectra. The D-glucan gave with iodine a faint blue color that had lmax 564 nm, indicating the polysaccharide of α-(1→4)-linkages with short, exterior chains.

PP-375

SEM-EDX/HPLC analysis and production of natural pigments from *Quercus ithaburensis* with al^{3+}, fe^{2+} and sn^{2+} metals

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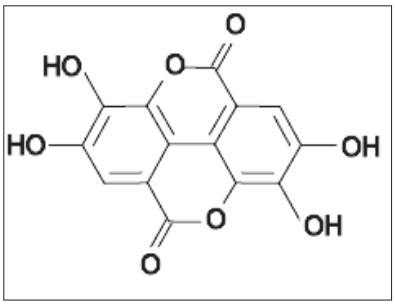
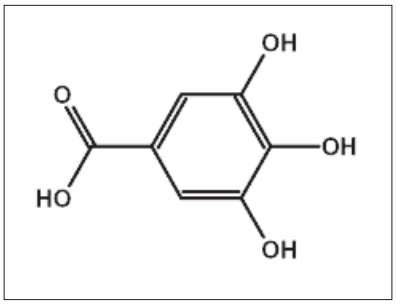
Walloon oak (*Quercus ithaburensis* Decaisne) acorn caps are rich sources of hydolysable tannins[1]. The hydrolysable tannins from acorn caps of this plant, ellagic acid that a gallic acid dimer, has bioactivities such as antioxidant, antimicrobial, antitumor, antiviral, preventive properties in many fields including pharmaceutical, food and chemical industries[2-4].

In this study, the walloon oak natural pigments (aluminium-walloon oak, tin-walloon oak and iron-walloon oak pigments) were obtained by the reaction of $KAl(SO_4)_2.12H_2O$, $SnCl_2.H_2O$ and $FeSO_4.7H_2O$ solutions with tannin compounds present in the walloon oak acorn cap extracts. A reversed - phase high performance liquid chromatograph (HPLC) with diode - array detection (DAD) method was utilized for the identification of hydrolysable tannins in the natural pigments. The HPLC gradient elution was performed using the method of Halpine *et al.*[5], Karapanagiotis *et al.*[6] and Karadag *et al.*[7]. The tannin extractions from the pigments were carried out with HCl / MeOH / H_2O (2:1:1; v/v/v) solution. According to the results of HPLC analysis of the natural pigments, gallic acid (**1**) and ellagic acid (**2**) in the non-hydrolysed walloon oak extract, the hydrolysed walloon oak extract and walloon oak – aluminium natural pigment, ellagic acid in the walloon oak – iron natural pigment and gallic acid in the walloon oak – tin natural pigment were identified. Using SEM/EDX several elements were detected in the plant and the pigments. The main three elements; O, Al and K in the aluminium-walloon oak natural pigment and O, Fe and K in the iron-walloon oak natural pigment, O, Sn and K the in tin-walloon oak natural pigment and in O, C and N in the

	Retention time (min)				
Identified tannin compound	**Acid hydrolyzed walloon oak extract**	**Non-acid hydrolyzed walloon oak extract**	**Al-walloon oak natural pigment**	**Fe-walloon oak natural pigment**	**Sn-walloon oak natural pigment**
Gallic acid	4.5	4.5	4.5	-	4.7
Ellagic acid	19.6	19.5	19.6	19.6	-





acorn cap of the plant were detected.

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PP-376

A new triterpene from *Scorzonera latifolia* (Fisch.and Mey.) DC.

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With the description of new species, the number of *Scorzonera* species reached 49 in Turkey. The members of *Scorzonera*, such as *S. mollis* Bieb., *S. suberosa* C. Koch, *S. cana* and *S. latifolia* (Fisch. and Mey.) DC., are edible. *Scorzonera* species have also been used in Turkish folk medicine for analgesic, diuretic, hypotensive, antidiabetic and antirheumatic effects. *Scorzonera latifolia* (Fisch. and Mey.) DC. is widely distributed in Central and East Anatolia. A mastic named *yakı sakızı* has been prepared from the latex of *S. latifolia* and is used in Turkish folk medicine as analgesic, as well as against infertility externally and as anthelmintic internally[1]. In our previous studies, we isolated four triterpene: taraxasteryl acetate, taraxasteryl myristate, fern-7-en-3-β-ol, fern-7-en-3-β-one; and one sterol: β-sitosterol[2]. Two dihydroisocoumarines hyrangenol and scorzotomentosin-4'-*O*-*β*-glucopyranoside were also isolated from *Scorzonera latifolia* roots[3]. As a part of our ongoing studies, a triterpene was obtained by using chromatographic techniques (column chromatography, preparative HPLC) from a *n*-hexane extract of *S. latifolia* roots as a new natural compound. Structure of the compound was elucidated by using ^{1}H-NMR, ^{13}C-NMR and 2D NMR techniques (HMBC, HMQC, COSY, TOCSY, NOESY, DEPT) as 3-β-hydroxy-fern-7-en-6-one acetate.

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PP-377

Chemical differences in two subspecies of *Centaurea yaltirikii*

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Centaurea yaltirikii N. Aksoy, H. Duman & A. Efe [1] is an endemic plant species of western Black Sea Region of Turkey. *Centaurea yaltirikii* is only known from two localities on the south of the Düzce districts in altitude between 400 and 1100 m in Euro-Siberian Flora Region. Currently, *Centaurea yaltrikii* N. Aksoy, H. Duman & A. Efe subsp. *dumanii* N. Aksoy & A. Efe was described as a new subspecies of *Centaurea yaltrikii* on the south of Kocaeli region in north western Anatolia of Turkey. *Centaurea yaltrikii* subsp. *dumanii* is a perennial herb with a woody rootstock, 20-35 cm long, generally 2-4 one-headed branches in upper part, spathulate leaves with arachnoid-tomentose and a few glandular hairs and yellow colored flowers.

Methanolic extracts were analyzed to confirm chemically not just in botanic point of view that *Centaurea yaltirikii* subsp. *yalitrikii* and *Centaurea yaltrikii* subsp. *dumanii* are two different subspecies. Plants of *C. yaltirikii* subsp. *yalitrikii* and *C. yaltrikii* subsp. *dumanii* were collected from the different localities in Turkey, A3, Düzce and A2-A3, Kocaeli. Voucher specimens of these plants are deposited in DUOF (The Herbarium of Düzce University Faculty of Forestry) as N. Aksoy 6654 and N. Aksoy 6659, respectively.

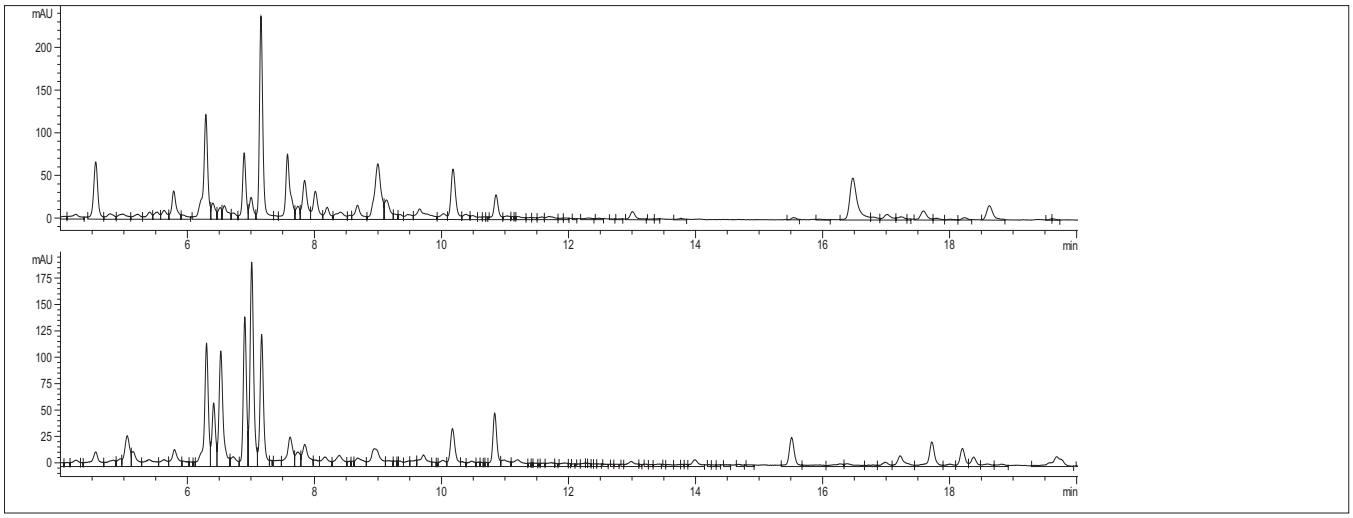

Figure 1: HPLC comparison of the extracts of *Centaurea yaltirikii* subsp. yaltirikii leaves (up) and *Centaurea yaltirikii* subsp. dumanii leaves (down)

Dried material was sorted into flowers and stalks. The samples was frozen by liquid nitrogen and then crushed. The solvent was mixed with plant material in ratio 10:1, extraction was supported with ultrasonic bath. After filtration were these extracts analyzed on HPLC with DAD (Diode Array Detector) and MSD (Mass Spectrometry Detector).

To analyze was applied adjusted method for analyzing polyphenols with help of gradient elution. As the solvent was used acetonitrile and 40 mM formic acid. Analyzed mass spectra were measured in negative mode.

As shown by HPLC analysis [Figure 1], extract samples differ in qualitative structure of phenolic compounds hence we have chemically proofed that both extract samples originate from different subspecies of *Centaurea yaltirikii*.

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PP-378

Secondary metabolites in *Gypsophila trichotoma* Wend

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Gypsophila trichotoma Wend. (Caryophyllaceae) is a perennial herbaceous plant, located in Southeast Europe, Southwest Asia, Kazakhstan, West Mongolia, Russia and Turkmenistan. The plant is spread in Bulgaria along of the Black Sea coast. Previous phytochemical study afforded the isolation and structure elucidation of triterpene saponins. Flavonoids, sterols and volatile compounds were obtained in the aerial parts by HPLC and GC methods.

The phytochemical study of the butanol extract from the aerial parts of *Gypsophila trichotoma* led to the isolation of apigenin 6-*C*-glucosyl-7-*O*-glucoside, also known as saponarin. Structural assessment of the compound was effected by acid hydrolysis and analysis of MS and ^{1}H and ^{13}C NMR spectroscopic data.

The antioxidant activity of the flavonoid was evaluated by a DPPH method. The compound showed a 88.8% (IC50 = 0.28 mg/ml) inhibition of DPPH radical in the concentration range 0.5 mg/ml.

The cytotoxicity of the flavonoid was tested in a panel of human tumor cell lines, using MTT-dye reduction assay. The compound caused concentration-dependent inhibition of malignant cell proliferation.

PP-379

Polyphenolic glycosides from flowers of *Jacaranda mimosifolia* D. Don

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Jacaranda mimosifolia, the plant of the Colombian folk medicine, is used to treat the infection of microbial origin. Its flowers contain anthocyanidins, its leaves have iridoids, triterpenes, flavones, phenylpropanoids and steroids[1]. All the already published studies are focused on the constituents of *Jacaranda mimosifolia* leaves; there isn't much scientific information about the constituents of the flowers.

Liquid chromatography coupled to diode array and electrospray ionozation mass spectrometry detection was used to analyze the polyphenolic constituens of the methanolic extract of *Jacaranda mimosifolia* flowers and preparative chromatography was used to isolate the main compounds. Two dominant compounds were identified by spectral analysis (IR, UV, MS, NMR) and by comparing with standards. Supposed antioxidant activity of the compounds was assessed by measuring of scavenging of hydroxyl radical, hydrogen peroxide, superoxid anion, peroxyl radical and DPPH.

The dominant compounds of the methanolic extract of *Jacaranda mimosifolia* flowers are acteoside and apigenin-7-*O*-galacturonopyranoside (we used column Supelcosil ABZ+Plus and gradient elution - start with 10 % of acetonitrile and 90 % of 40 mM HCOOH, to 40. min with 100 % of acetonitrile). These compounds were isolated earlier from the aqueous methanol extract of *Jacaranda mimosifolia* leaves[2].

Acteoside is the compound with strong antioxidant activity, it has also cytotoxic and anti-inflammatory activity[3]. In our study, the

acteoside scavenged hydrogen peroxide, superoxid anion, peroxyl radical and DPPH better than standards Trolox C and quercetin.

Acknowledgement
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PP-380

Studies on the interactions of *Safranal* with i-motif and G-Quadrauplexe structures

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Saffron is the red dried stigmas of *Crocus sativus* L. The biological activity of saffron in modern medicine is in development. Its numerous applications as an anti-oxidant and anti-cancer agent are due to its secondary metabolites. Saffron mainly targets DNA by binding minor groove, thus the present study attempted to investigate the interaction of safranal- one saffron monoterpene aldehyde- which is responsible for its odor with specific oligonucleotides. By circular dichroism studies strongly suggest that selected sequences adapt an I-motif and G-quadruplexe structures. Tandemly repeated sequences of cytosine and guanine are normally found at the 5 '-ending strands of telomeres of eukaryotic chromosomes, in other non-coding regions of eukaryotic DNA, including promoter sites, satellite DNAs and introns. We used followed primers for experiment.
I-motif $(CCCTAA)_3CCCT$
G-quadruplexe GGT-TGG-TGT-GGT-TG-<G>
Our results in this study have indicated that safranal can interact with, and stabilize these structures in our selected sequences. In conclusion, the saffron molecular components for instance safranal might be potential lead compounds for the development of new telomerase inhibitors and a new class of antiproliferative therapeutic drugs, which interact with sequence-specific oligonucleotides and induce some conformational changes in them slightly.

PP-381

Development and validation of a HPTLC densitometric method for the assay of rutin in *violae tricoloris* herba

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Wild pansy (*Viola tricolor* L.) is an important medicinal plant for its content of rutin. In our work, we developed a new HPTLC method for the quantification of rutin in this herb. The method involves densitometric evaluation of rutin after scanning at 263 nm of HPTLC plate with rutin standard and samples, developed in ethyl acetate: formic acid: acetic acid: methyl ethyl ketone: water= 50: 7: 3: 30: 10 as mobile phase.
The method was validated for specificity (the overlay of UV spectrum of standard rutin and rutin in plant), linearity (there was a good linear relationship between peak area and the amount of rutin standard in the range of 0.6 – 1.4 µg/spot), precision (instrumental precision was found 2.02 % RSD; repetability of the method was found 2.64 % RSD), accuracy (the average percentage recovery was found 98.5 %). The rutin content of herb extract in alcohol 70 % V/V was found 0.52 % (w/w).
The developed HPTLC densitometric method is specific, precise and accurate for quantification of rutin in wild pansy.

PP-382

Determination of rutin in orange (*Citrus aurantium* L. Rutaceae), Lemon (*Citrus limonum* L. Rutaceae) and Grapefruit (*Citrus paradisi*, Rutaceae)

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In this study, using HPLC-ED system, quantification of rutin was carried out in different extracts of orange, lemon and grapefruit. Analyses of rutin were performed on the frits of orange, lemon and grapefruit. Rutin was extracted with hot and cold water. Supernatant was used for analyses. The standard solution was rutin. HPLC conditions: Mobile phase methanol-acetonitrile-HPLC water-acetic acid (20+10+70+1); Potential: +0.840 V; Flow rate 0.8 ml/min; Column: ODS hypersil. Determination of rutin was based on a comparison of retention time obtained from standard solution of rutin and retention time obtained from rutin in fruit extracts. Content of rutin (mg/g) was highest in the orange (cortex, flavedo 33.5; albedo 25.0 and juice 5.0), lemon (cortex, flavedo 0,13; albedo 0,04 and juice 0.05) and grapefruit (cortex, flavedo 0.075; albedo 0.15 and juice 0.003). The highest content of rutin has been found in fruits of orange.

PP-383

HPLC of phosphorus-containing derivatives of guaianolides

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For the first time the optimum conditions of chromatographic analysis with application of the reversed-phase variant of HPLC of the phosphorus-containing derivatives of sesquiterpene lactones of guaiane type – arglabin, grosheimine, estafiatine were selected.
At the analysis of the sesquiterpene lactones and their phosphorus-containing derivatives the stationary phase Zorbax SB-C_{18} (5 µm), Separon SGX C_{18} (7 µm); composition of mobile phase: mixes of acetonitrile - water in the ratio 1:1 and methanol - water (1:1) were used. Detection was carried out by UV-detector at 204 nm and refractometer. During the carrying out of the analysis of phosphorus-containing derivatives of above-listed sesquiterpene lactones it is determined by HPLC method that the attachment of dialkylphosphite - anion on exomethylene group reduces the retention time. Influence of structure of dialkylphosphonates on the retention time is controlled by variation of substituents at atom of phosphorus, i.e. with increase in volume of substituents at atom of phosphorus, the retention time of the obtained derivatives is raised, therefore, it is eluted

at first dimethylphosphonates, further diethylphosphonates, then dipropropylphosphonates and the last dibutylphosphonates.
Thus, the optimum conditions for analysis were selected with HPLC of the phosphorus-containing derivatives of sesquiterpene lactones of guaiane type. The appropriateness of chromatographic behaviour of phosphorus-containing derivatives of sesquiterpene lactones in interrelation with the structural features of their molecules was studied.

PP-384

Hplc of chlor-containing derivatives of α-santonin

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For the first time the research was carried out by the reversed-phase variant of HPLC of chlorine-containing derivatives of α-santonin. At analysis of α-santonin and the chlorine-containing compounds obtained on its basis, the stationary phase Separon SGX C18 (7 μm), mobile phase - mix of methanol-water (1:1) were used. Detection was carried out by the UV-detector at 240 nm and refractometer.
As has shown the research of modified derivatives of α-santonin, introduction of atom of chlorine in a molecule of an initial lactone increased the retention time. So, if for α-santonin it made 12.27 min, for monochloride-α-santonin – 19.38 min, and for dichloride-α-santonin – 37.20 min. The presence of atom of chlorine and methoxygroup in a molecule led to that 4α-methoxy-5β-chlorsantonin (34.89 min) eluted from a column later than α-santonin (12,27 min) and monochloride-α-santonin (19.38 min) but earlier than dichloride-α-santonin (37.20 min). 2-chlor-4,5α-epoxysantonin has the biggest retention time of 41,84 min from all chlorine-containing derivatives of α-santonin that it was connected with the presence of epoxygroup in a molecule besides atom of chlorine.
It was experimentally determined that the presence of oxime group in a molecule also increased the retention time of the modified derivatives, therefore the retention time of oxime-4α-methoxy-5-chlorsantonin made 43,76 min.
Thus, as a result of the studied work, the individual selection of conditions for the analysis by method HPLC of chlorine-containing derivatives of α-santonin was carried out and appropriateness of influence of structure of the investigated components on their retention time was studied.

PP-385

Synthesis of biologically active derivatives of sesquiterpene lactones

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The sesquiterpene lactones, possessing a wide spectrum of biological activity, represent the significant interest among compounds of secondary metabolism in organism of plants. On the other hand, terpenoides of the given number can be considered as the renewed chemical material promoting the development of a good base for the subsequent synthetic researches directed on the obtaining of new biologically highly active derivatives. We have carried out for the first time the reactions of phosphorylation, cyclopropation, and azidolize on the basis of sesquiterpene lactones. The interaction of guaianolides arglabin (1) and grosheimine (2), germacranolide argolide (3), eudesmanolide isoalantolactone (4), cadinanolide arteannuine B (5) with dialkylphosphites in soft conditions, which selectively leads to the formation of dialkyl- and hidroxyphosphonates of sesquiterpene lactones. At interaction guaianolide arglabin (1) with dimethyl-, diethyl- and dipropylphosphites the phosphonates (6-8) are obtained with yield of 35, 70 and 88 % accordingly.
Thus, we have for the first time obtained before unknown representatives of sesquiterpene lactones, containing in a molecule of atom of phosphorus, dihalogencyclopropane fragment and azide group. The biological activity of the obtained new derivatives of natural sesquiterpene lactones is studied.

PP-386

High-performance thin layer chromatographic analysis of 6- gingerol in ginger-containing dietary supplements, teas and creams

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A sensitive and accurate high-performance thin layer chromatography (HPTLC) method has been developed to determine the quantity of 6-gingerol in ginger containing dietary supplements, teas and creams. 6-gingerol was separated on aluminum-backed silica gel 60 F_{254} plates with n-hexane-ethyl acetate 40:60 (%, *v/v*) as mobile phase. A compact band was obtained for 6-gingerol at R_f value of 0.33±0.04. The calibration plot was linear in the range of 50-1000 ng/spot of 6-gingerol and the correlation coefficient of 0.995 was indicative of good linear dependence of peak area on concentration. The developed HPTLC densitometric method was found cheap, selective, precise and accurate and can be used for routine analysis of gingers in the herbal drugs industry quality control laboratories.

PP-387

Bioguided isolation of antioxidants from plumbaginaceae of the desertic daya flora

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Desertic or semi-desertic plants are submitted to strong oxidative stress because of intense UV exposition and severe ranges of temperature. Owing to their particular biotope, we selected some of these Algerian species in order to identify antioxidant or UV blocking constituents. We present here a chemical and biological investigation of *Limoniastrum feei* (Girard) Batt. and L*imonium bondueli* (kuntze) (Plumbaginaceae), two species belonging to the desertic Dayas flora.[1,2] The first species is used in folk medicine and it was shown that it present a strong antimicrobial activity.[3,4] Bioguided fractionation of EtOAc extract from leaves of *Limoniastrum feei* (Girard) BATT. (Plumbaginaceae) led to the isolation of 7 polyphenols as gallic acid (1), myrciaphenone A (2), myricetin-3-O-β-glucopyranoside (3-1), epigallocatechin gallate

(EGCG) (3-2), myricetin 3-O--rhamnopyranoside (4), quercetin (**5**) and myricetin (**6**). Gallic acid was the most active compound in DPPH$^{\bullet}$ (0.94±0.68 µg/ml) and FRAP 0.83±0.15 (µM Fe^{2+}/ml) tests; whereas myricetin was more specific to superoxide radical $O_2^{\bullet-}$ since it was the most active product in superoxide nitroblue tetrazolium hypoxanthine/xanthine oxidase test (1.86±0.12 µg/ml).Whereas EtOac extract from leaves of *Limonium bondueli* led to the isolation of eryodictiol (8,7 ± 0,8 µg/ml) , as the most active product in DPPH and superoxide radical $O_2^{\bullet-}$ respectively .

Acknowledgement
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PP-388

Pyhtoequivalance and quality control analysis of several preparations of *Cynara scolymus* l. Utilized for liver and digestive disorders

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Cynara scolymus (artichoke) is a member of Compositae family that grows in coastal regions of Anatolia, Turkey. The leaves of the plant are used as choleretic, digestive, diuretic and hepatoprotective.[1] In this study, air-dried and powdered leaves of *Cynara scolymus* (750 g) were extracted with methanol:water (70:30). The extract was subjected to liquid-liquid extraction with n-hexane, chloroform, ethylacetate and n-buthanol respectively.The fractions were controlled with TLC and HPLC.[2,3] N-butanol fraction was seperated to subfractions on silica gel with column chromatography. After purification by preparative TLC and cyristalization techniques, the isolated compounds luteolin-7-glycopyranoside (cynaroside) and 5-caffeoylquinic acid (chlorogenic acid) were identified by ^{1}H-NMR and ^{13}C-NMR.[4,5]
Both the isolated compounds and apigenin (Serva), naringenin (Sigma) and luteolin (Sigma) were used as standarts for HPLC analysis which was carried on six different *Cynara scolymus* preparations sold in markets. This is the first study to show the phytoequivalance of *Cynara scolymus* preparations, which are sold in Turkey.
In conclusion, the present study reveals that some of the preparations of *Cynara scolymus* in the markets are phytoequivalent in their quantitative contents but comprise different amounts of active compounds and they have different potentials.

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PP-389

Phytochemical investigations on *Urtica dioica* to study its nutraceutical effects

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Urtica is one of the medicinal herbs commonly used in Iranian traditional medicine.
To investigate nutraceutical effects of some Iranian medicinal herbs, the water extract of *Urtica dioica* was analyzed using Atomic Absorption. The results showed that it consists of sufficient nutrient elements viz. Fe, Zn, Cu, etc. And also tests on mice showed it has medicinal activities like antidiabietic activity etc.

PP-390

Fatty acid composition of *liquidambar orientalis mill., Helichrysum italicum and Allium subhirsitum*

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Sığla tree (*Liquidambar orientalis* Mill.) belonging to Hamamelidaceae family is an endemic species in Turkey [1] The storax produced by injuring *L. orientalis* Mill. has good antiseptic properties. Also it is used as a topical parasiticide, expectorant and for the treatment of some skin diseases in Turkish folk medicine. The bitter taste and odour are typical properties of storax.[2,3] It has a wide application in cosmetics. According to literature the composition and antimicrobial activity of *L. orientalis* Mill., essential oil obtained from its leaves, and the MeOH extract of storax had reported.[4,5] In its' essential oil, many components were characterized, but the major ones were terpinen-4-ol, α-terpinol, sabinene and γ -terpinene. However, we have investigated the n-hexane extract of storax which has not previously been studied in terms of fatty acid composition.
The genus *Helichrysum*, belonging to the family Asteraceae is represented by approximately 300 species in the world. This genus is represented in Turkish flora by18 taxa, of which 9 are endemic. *H. arenarium*, *H. angustifolium*, *H. italicum* and *H. stoechas* are used in folk medicine for their anti-inflammatory and anti-allergic properties.[6] Previous studies on *H. italicum* revealed GC-MS analysis of its' essential oil.[7] Our study is on GC-MS analysis of n-hexane extract from above ground of plant. It is well-known that the *Allium* genus with 500 species has a wide distribution in the northern hemisphere and is a rich source of steroidal saponins as well as sulfur containing compounds.[8] There are some studies about the volatile oil of different *Allium* species. [9] As far as our literature survey could ascertain, this is the first fatty acid composition report on *A. subhirsitum*.
The n-hexane extracts of *H. italicum*, *A. subhirsitum* and storax (resin obtained from *L. orientalis* bark) were obtained using a Soxhlet apparatus. After that, the oil samples were derivatized to their methyl esters and they were analyzed by GC-MS using a suitable column and temperature programme.

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PP-391

The content of total sulphur in the serbian domestic populations of spring garlic (*Allium sativum ssp. Vulgare*)

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More than thirty ecotypes of spring garlic (*Allium sativum ssp. vulgare*) from the territory of the Republic of Serbia can be found in the »gene« collection at the Faculty of Agriculture, Belgrade University. For the purposes of this research from the above mentioned collection, twenty populations are chosen from the following municipalities: Knjaževac (SG-1), Bujanovac (SG-2, SG-22), Bela Palanka (SG-6), Lebane (SG-8), Šabac (SG-12), Mionica (SG-13), Valjevo (SG-14, SG-15, SG-17), Ljig (SG-16), Rača (SG-18), Preševo (SG-20), Vranje (SG-21), Negotin (SG-19, SG-25, SG-27, SG-28, SG-29), Vladimirci (SG-26). The content of total sulphur in the mature bulbs is examinated (Vario EL III, Elemental Analyzer) and shown in percents.
The content of total sulphur ranged from 0.37 to 0.58%. The lowest values of total sulphur in the population were registered in SG-18 (0.37 %) i SG-12 (0.38 %). Populations marked as SG-29 and SG-15 were valued at 0.58 i.e. 0.56%. Every population from the municipality of Valjevo has high content of total sulphur which ranges from 0.54 to 0.56 %.

PP-392

Recognition of phenolic compounds in ethyl acetate fraction of *Salvia mirzayanii* rech

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In traditional medicine, *Salvia* species possessed different biologiacal activities such as antidiabetic and antioxidant. One of the *Salvia* species is *Salvia mirzayanii* Rech, grows in Iran, near persian Golf. Previously the antioxidant activity of this *Salvia* species was reported. In this research, the antioxidant (phenolic) compounds of this extract was recognized by using liquid chromatography coupled to negative electrospray ionization (ESI) tandem mass spectrometry (MS/MS). Aerial parts of SM (5 kg) were percolated with ethanol to give 452.6 g of crude extract. The methanol solution of this extract was eluted with petroleum ether, chloroform, ethyl acetate and n-butanol. Fifty µl of this fraction was dissolved in solution of methanol and deionized water. Then the solution was filtered and was injected to LC/MS. The phenolic compounds were identified by using full scan mode (MS), and tandem mass experiments (MS/MS) of precursors ions. The phenolic compounds were characterized based on their UV spectra and their fragmentation pattern. Totally six flavonoids were identified in ethyl acetate fraction of *Salvia mirzayanii* extract. These flavonoids are derivatives of apigenin such as apigenin 6-C glycoside, apigenin 7-O glycoside and flavones include kaempferol, kaempferol 3-di glucoside, and methylated kaempferol 3-di glucoside.

PP-393

Comparison of the quantity of flavonoids in some populations of *Teucrium chamaedrys* in Bulgaria

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The species *Teucrium chamaedrys* L. is a variable taxon of the genus *Teucrium* widely distributed in Europe. Two morphological ecotypes were found growing on and off serpentine habitats in Bulgaria. The aims of this study were to investigate natural serpentine and non-serpentine populations in order to: 1) compare the quantity of flavonoids in populations growing on and off serpentine, 2) evaluate whether the differences in the quantity of the flavonoids are in relation with the amount of Ca, Mg, Fe, Ni, Cr, Co and Cd in plants from these populations. Eight populations were investigated to determine the total amount of flavonoids. It varied from 0.11% to 1.03%. The statistical methods (PCA) were used to perform delimitation of the populations on the basis of the chemical elements content and total flavonoids in plants. The results did not demonstrate the delimitation of the serpentine from the non-serpentine populations only by the quantity of flavonoids. The only positive correlation was shown between the quantity of flavonoids and the amount of Mg in plant tissues.
This preliminary data on the quality of flavonoids between the populations studied demonstrated variations and further attention has to be paid to the environmentally influenced profiles of flavonoids.

PP-394

Researches regarding the extractability of some active principles from *Ajuga reptans* l. And ajuga *genevensis* l. With solvents of different polarities

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In the context of research conducted in the shaping of bioaccumulation of secondary metabolites in two species of medicinal interest, *Ajuga reptans* L. and *Ajuga genevensis* L., we have found an inter- polyand intraspecific variability, the first being richer in antiinflammatory principles than the second. Since the plant product is used for herbal medicines that should be standardized, we assesed the extractability of the iridoids, flavonoids and polyphenolcarboxylic acids in solvents with

different hydrofilia: methanol, ethanol 70^c, 50^c and 40^c. In the obtained extracts (DEV = 0.5:100 g/ml; repeated reflux) were determined spectrophotometrically the active principles and then we calculated the compounds extractability and compared it with the values recorded for the methanolic extracts. For both species, ethanol 70^c proved to be the best solvent compared to the methanolic extract when the extraction yield for iridoids was 168.69 % and 105.06 % for flavonoids in *A. reptans*, while for *A. genevensis*, the values were 107.12 % and 227 % respectively. Thus, the assessment of pharmaceutical quality of the raw material and later for the standardization of herbal medicines the producer will have to apply the 70^c ethanol extraction.

PP-395

Effect of development stage at harvest on the content of flavonoids and phenolic acids in aerial parts of thyme (*Thymus vulgaris*)

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Thyme possesses antimicrobial and antioxidant activities. The antioxidant activity is mainly due to flavonoids and phenolic acids (PA). The content of polyphenols in thyme may, however, depend on growing conditions and development stage at harvest. The present study investigated how the content of polyphenols in thyme depends on plant development.

Plants were cultivated over two years and harvested at five different development stages around flowering. Polyphenols were identified from methanol extracts by LC-MS/MS and quantified by HPLC. Major polyphenols were apigenin 6,8-di-*C*-*β*-glucopyranosyl, apigenin-7-*O*-glucuronide, luteolin-7-*O*-β-glucopyranoside, luteolin-7-*O*-glucuronide, and rosmarinic acid. Concentration of flavonoids varied from 2.3–6.8 mg/g dry matter (DM) (year 1) and 4.7–11.5 mg/g DM (year 2), and PA from 5.4–8.2 mg/DM (year 1) and 15.4–22.9 mg/g DM (year 2). The highest content of flavonoids was obtained at first harvest in early June (pre-flowering stage) in both years. The content of PA was more variable being three times higher in year 2 compared to year 1. In year 1 the content of PA was not significantly affected by harvest time but in year 2 the highest content was at first harvest. Hence, development stage has a significant impact on the concentration of polyphenols in thyme.

PP-396

Isolation of phytoconstituents from *anthemis cotula*

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Anthemis cotula is an herb growing in temperate regions of Europe, Asia and Africa. It is used as a tonic, antispasmodic and during convalescence from fever. In India this herb is used as a remedy for stings from bees by rubbing the leaves over the affected skin. The sister species of the genus *Anthemis* are reported to contain azulenes, sesquiterpenes, phenolic compounds, coumarins and alkaloids. This study involves isolation and characterization of some sesquiterpenes, flavonoids, and essential oils.

The solvent free ethanolic extract was extracted with ethyl acetate in water using liquid-liquid extractor. The extract was evapoarated to dryness and was subjected to column chromatography for the separation of compounds. In all five compounds were isolated and characterized by spectral methods. Isolated compounds were 1) Eupalatin (3,5,4'-trihydroxy, 6,7-dimethoxy flavone) 2) Cirsimasitin (6,7-dimethoxy,5,4' dihydroxy flavone. 3) Liquiritegenin 7,4' dihydroxyl flavanone 4) Ceryl alcohol 5) β-sitosterol. Petroleum ether extract of this plant was subjected to steam distillation and was subjected to column chromatography for separation of oils. In all 9 oils were isolated and characterized by Infra red spectroscopy. Isolated oils are 1) Citral 2) Garaniol 3)Linalool 4) Citronellol 5) α-terpineol 6) Farnesol 7) Thymol 8) Cineole 9) α-pinene.

PP-397

Determination of Zinc, Iron and Manganese in *Thymus pannonicus* all. (Lamiaceae) and Rhizosphere soil samples from several locations in Serbia

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In southern Banat, the dried herb of *T. pannonicus* All. is used to make tasty and refreshing herbal tea drinks, owing to its peculiar and pleasant lemon-like scent. It is already reported that the essential oil of *Th. pannonicus* growing on Mt Vršačke planine is much higher in citral, compared to findings in the other European countries. In this paper, the results of assays on zinc, iron and manganese contents in *Th. pannonicus* herb and rhizosphere soil samples, collected from locations on Vršačke planine, Stol and Rtanj, were presented. All samples were subjected to MW digestion prior to measurements by FAAS. The results in the soil samples were as follows: Fe = 22102 – 46193 mg kg^{-1}, Mn = 776.95 – 4209.98 mg kg^{-1} and Zn = 62.78 – 214.02 mg kg^{-1}. In the samples of plant material, it was noticed that iron content varied in a broad range (254.68 – 1454.07 mg kg^{-1}), while zinc concentrations were found to be very low (1.81 – 6.08 mg kg^{-1}) and manganese in the range between 89.29 and 278.25 mg kg^{-1}. It is important to point out that no significant sources of pollutions and anthropogenic activity were detected in selected locations for analyzed elements.

PP-398

Biotransformation of citral by four methods with *Saccharomyces cerevisae and Penicillium* sp.

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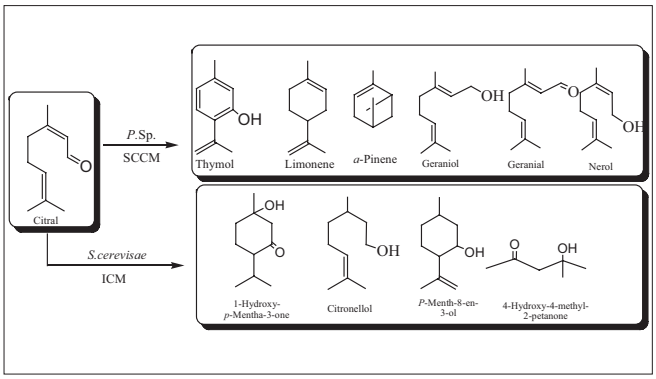
Citronellol is a fragrance ingredient used in decorative cosmetics and fine fragrances. Its use worldwide is in the region of greater than 1,000 metric tons *per annum*. Previous studies concerning the biotransformation of (L)-citronellal to (L)-citronellol using free and immobilized cells of *Rhodotorula minuta* have been reported. The objective of this research was to study the pathways involved during biotransformation of citral by the free cell method (FCM) and the immobilized cell method (ICM) by *Saccharomyces cerevisae* and sporulated surface cultures method (SSCM) and liquid method (LM) using *Penicillium* sp. The culture preparation was done using such variables as different microbial methods, days,



and incubation periods to obtain maximum cells of *S. cerevisae* and *Penicillium* sp. for citral biotransformation. It was found that with both FCM and ICM citral converted to citronellol in high percentages and thymol, and geranial were identified with both SSCM and LM microbial transformation citral. The biotransformation products were identified by their theoretical study (TS), fourier-transform infrared spectroscopy (FT-IR), and ultraviolet visible (UV), gas chromatography (GC), and gas chromatography/mass spectroscopy (GC/MS). Comparison of the four methods showed ICM and SSCM were more effective, its major products being citronellol (48.5%) and thymol (21.5%), respectively.

PP-399

Characterization of the morphogenetic and phytochemical potentials of natural and tissue cultures of *Veronica officinalis* L.

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Due to the importance of the *Veronica officinalis* species for phytopharmacy, cosmetics and food industry, there are concerns to introduce it into culture. Supplementation with medicinal plants is based – in recent practice – on collecting plants from the natural medium and/or on *ex-situ* production in agro-ecosystems. Introducing into culture species originating from natural habitats (morpho-heterogenous and phytochemically phenologic), is a long process that might be accelerated by suited selection. Tissue cultures of *Veronica officinalis*, constitutes a complementary technique in selecting bioforms with a raised biosynthetical capacity.

We consider the *in vitro* plant regeneration a useful and important possibility in the multiplication of genotypes valuable from the phytochemical point of view. The isolated phytocomplex varies due to the genotype, fact that is of importance in the multiplication of the vegetal material. Using regeneration techniques, through tissue cultures, had as an aim the micropropagation of valuable genotypes, with well defined biochemical characteristics. We evaluated the biosynthetic spectrum of polyphenolic, flavonoidic, triterpenic and iridoidic components through TLC. The RP-HPLC method aimed the separation and quantitative determination of the polyphenolic and flavonic compounds that are present in the obtained alcoholic extracts. The comparative biosynthetic spectrum of the phytocomplex, of the plants from conventional cultures and of those regenerated by means of tissue cultures, was in the normal variation limits.

PP-400

Comparative morpho-chemical studies in experimental cultures of *Nepeta cataria* L.

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Nepeta cataria was less studied in Romania but is now the object of comparative studies in conventional and tissue cultures due to its pharmacognostic and pharmacological actions. To evaluate the phytocomplex, the comparative samples were made of the vegetal material (*herba*) from donor plants – obtained by conventional techniques, from *Nepeta cataria* plantlets regenerated *in vitro* respectively. We initiated tissue cultures of explants obtained from donor plants of the plants selected from the experimental field (*Nepeta cataria*), explants consisting of apical and axillary buds. With *Nepeta cataria*, the biological material used to initiate the tissue cultures is represented by plantlets resulted after seed germination and on MS (in aseptic conditions). The aseptically isolated explants were inoculated on MS, without growth regulators. To initiate caulogenesis, we used variants of MS media supplemented with BAP and NAA. An optimum morphogenetic reaction was obtained by the explants (apical and axillary buds) cultivated on variant BN (2.0 ml/l BAP and 0.3 ml/l NAA), the shoots obtained having a typical aspect.

In absolute methanolic extracts of *Nepeta cataria* (2009) we identified, by HPLC, polyphenolic compounds: chlorogenic, caffeic and rosmarinic acids, the flavonoids apigenol and luteolin derivates, due to the available standards.

PP-401

The initiation of *In vitro* cultures of *Rosa canina* L. Preliminary data

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The wild rose is a native, thorny, xeromesophytic shrub, spread from a 0 to 1200 metres altitude in Romania. Its fruit contain sugars, organic acids, pectin, tannins, vitamins (mostly C vitamin), carotene, mineral salts etc. and are a valuable raw material to either food or pharmaceutical industry. In view of bringing into culture and multiplying some valuable genotypes, our aim is to study the *in vitro* reaction of *Rosa canina* L. species and elaborate an *in vitro* micropropagation technology.

For the initiation of *in vitro* cultures, shoot tips of dog rose were harvested from some individuals within cultures at SC Fructex SA Bacău on July 2nd 2009. There have been used two variants of disinfestation: immersion into 0.1% solution of mercury chloride for 4 - 5 minutes, followed by a 5% chloramine T solution for 12-10 minutes,. The explants were subsequently rinsed with sterile distilled water for three times, and inoculated either on hormone free MS (1962), or on several variants of MS medium (A_2 – 2 mg l^{-1} IAA; BA_1- 1 mg l^{-1} BAP and 0.5 mg l^{-1} IAA; BB_2 - 1 mg l^{-1} BAP and 0.5 mg l^{-1} IBA; KN_1 - 1 mg l^{-1} Kin and 0.5

mg l^{-1} NAA). The *in vitro* cultures were incubated in a climatised growth chamber with controlled parameters (a temperature of 20^0C, a 12 hour photoperiod, a light intensity of 2500 lx). Both variants of disinfestation were successful.
The shoots that survived on hormone-free MS were transfered at one month period, first on BA_1 variant (with a faible reaction), then on KN_1 and BB_1. The shoots resumed their growth and provided at the contact with culture medium a muff of compact green callus, with an average proliferation, (this callus was also generated by leaf petioles that lie on the culture medium). The callus provided around 4-5 new shoots/explant. The morphogenetic reaction was more varied on KN_1 medium, meaning that the shoots either displayed a similar reaction of the BB_1 variant (but fainter), or provided solely callus and the shoot degenerated, or it stimulated both shoot growth and callogenesis and rhysogenesis (sporadically) within the nutritive medium. Fragments of the obtained callus were inoculated on BB_1, A_2, and BG_1 (1 mg l^{-1} BAP and 0,5 mg l^{-1} GA) medium variants. It is only the transfer on BB_1 that seems to be successful. This hormonic variant assured the consistency and colour of callus, was highly proliferative and sporadically generated new shoots. The multiplication of callus on the other investigated hormonic variants was reduced. The callus turned brown-greenish and displayed a tendency to degenerate. The shoot transfer from hormone-free MS to KN_1 in view of stimulating the rhysogenesis has a minimal turnover (only 1 out of 8 shoots provided roots).

PP-402

Development of NaCl-tolerant line in *tanacetum cinerariaefolium* through shoot organogenesis of selected callus line

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Plants were regenerated successfully through shoot organogenesis of a NaCl-selected callus line of *Tanacetum cinerariaefolium* developed through stepwise increase in NaCl concentration in MS medium. Increasing NaCl level concentration (0, 5, 10, 15, 20, 25, 30, 35, 40, 45mM) from low level to high level was found to be a better way to isolate NaCl-tolerant callus line, since direct transfer of callus to high saline medium was detrimental to callus survival and growth. Among different media and PGR treatments, MS media containing 1 mgl^{-1} BA and NAA or 1 mgl^{-1} BA, 2 mgl^{-1} NAA and 0.5 mgl^{-1} GA_3 for shoot organogenesis in selected callus line and B5 medium with 2 mgl^{-1} NAA showed best response for root regeneration. As increasing NaCl concentrations (From 0 to 45 mM the ability of shoot and root regeneration were decreased. The selected callus line showed significance increase in proline content and decrease in pyretrine content. Based on growth performance and proline content (20 mM in callus line and 35 mM in shoot culture) could be considered as NaCl-tolerant line showing all positive adaptive features towards the salinity stress. Further study to check the genetic stability of the induced salt-tolerance plants is necessary.

PP-403

Effect of salicylic acid on milk thistle development, seed yield and silymarin content

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An important consideration for milk thistle (*Silybum marianum* L.) cultivation is regulating development to lengthen the reproductive stage and increase seed yield with high silymarin content. The treatment of milk thistle with different concentrations of salicylic acid (0, 10^{-2}, 10^{-4} and 10^{-6} M) showed increase in the proportion of mature flower heads. Highest seed yield, chlorophyll content, photosynthesis, water use efficiency, mesophyl efficiency and highest content of silymarin was found in plants treated with 10^{-6} salicylic acid, whereas in plants treated with high concentrations of SA the total amount of silymarin and seed yield per hectare were decreased.

PP-404

Effects of gibberellic acid, Kinetin, Iron and Zinc on *Nigella sativa* l.

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A field experiment was carried out in the Experimental Farm of Persian Gulf University. The aim was to study the effects of GA_3 (100 ppm), kin (50 ppm), Fe (100 ppm) and Zn (100 ppm) on vegetative and reproductive characteristic in order to define the optimum treatment for best yields of *Nigella sativa*, L. seeds and oil. Kinetin increased number of branches and capsules per plant, seed yield as well as fixed and volatile oil yields. Chlorophylls in leaves were not affected by any of used growth regulators. The results showed that GA_3 increased number of seeds per capsule, fresh and dry weights of herb, plant height, seed yield as well as fixed and volatile oil yields. application Fe + Zn increased fresh and dry weights of herb, capsule number, seed yield, number of branches, fixed and volatile oil yields. Zn treatment alone was not effective. Gibberellic acid combined with either Zn or Fe+Zn resulted in the maximum values of plant height as well as fresh and dry weights of herb. Meanwhile, BA combined with Fe+Zn increased number of capsules, seed yield, fixed and volatile oil yields.

PP-405

Callus induction and plant regeneration in neem (*Azadirachta Indica*)

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A method for rapid micropropagation of neem through plant regeneration from leaf and petiole explant derived calli has been developed. The petiole, leaf and stem segments were cultured on MS medium supplemented with the combination of auxins and BA for callus induction. All stem explants on SH medium containing 2 mg l^{-1} NAA and 0.2 mg l^{-1} BA produced callus. The highest rate of callus growth was observed on MS medium supplemented with 0.6 mg l^{-1} BA and 4 mg l^{-1} NAA. Shoot regeneration was obtained successfully by using step-by-step method. Firstly, callus was subcultured on MS medium containing 0.2 mg l^{-1} 2,4-D and then, the calli were transferred to MS medium containing 4 mg l^{-1} BA, 1 mg l^{-1} NAA and 0.5 mg l^{-1} folic acid. In the latter step, some protuberances were appeared on compact calli. These protuberances produced shoots on

MS media containing 1 mg l^{-1} BA and 1 mg l^{-1} NAA or 1 mg l^{-1} BA and 2 mg l^{-1} NAA and 0.4 mg l^{-1} GA3. The optimal rooting response was observed on B5 medium supplemented with 1 mg l^{-1} NAA, on which 84% of the regenerated shoots developed roots successfully.

PP-406

Identification and characterization of phytoplasma infecting medicinal plants in India

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Thirteen medicinal plants viz. *Santalum album, Withania somnifera, Cannabis sativa, Tagetes erecta, Portulaca grandiflora, Rosa alba, Catharanthus roseus, Areca catechu, Ziziphus jujuba*, *Araucaria heterophylla, Cocos nucifera, Datura inoxia* and *Hibiscus rosa-sinensis* showing suspected phytoplasma *symptoms* were identified for phytoplasma association in India through nested PCR assays. The most peculiar symptoms observed on these medicinal plants were yellows, little leaf, witches'- broom, phyllody, spike disease, proliferation of axillary shoots, leaves malformed, golden yellow, severe rosetting, wilting, stunting and death of entire plants. DNA from suspected phytoplasma symptomatic medicinal plants was extracted and amplification of phytoplasmal ribosomal DNA (rDNA) was done with the universal phytoplasma primer pairs. The amplicon amplified in nested PCR was cloned and sequenced. The 16Sr RNA sequence comparison clearly indicates that all the thirteen phytoplasma identified on medicinal plants in India belonged to 4 different taxonomic groups of phytoplasma, viz. 16SrI, 16SrIV, 16SrV and 16SrVI among which the 16SrI group predominates over others. This indicates the wide spread occurrence of aster yellows group (16SrI) of phytoplasma infecting medicinal plants in India.

PP-407

Establishing callus culture of natural tetraploid *Trifolium pratense* l. (Elçi red clover) and determination of isoflavonoid production in field samples and callus cultures

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Fabaceae species such as *Trifolium* sp. and *Medicago* sp. are known for their phytoestrogen effects. *Trifolium pratense* is cultivated world-wide; its phytochemical characteristics are being investigated. The subject of the study are diploid types of *T. pratense* L. and tetraploid *T. pratense* (Elçi red clover), which is a noteworthy plant cultivated in our country. The natural tetraploid *T. pratense* are valuable in terms of pharmacological aspects besides their values as pasture plant. In our study both species cultivated in the experimentation garden of Ankara Uni. Faculty of Science. The field samples and the seeds of the seedlings obtained from the mentioned experimentation gardens. The collected aboveground organs of the plants were freeze dried to analyze their isoflavonoid content. After surface sterilization, seeds were germinated onto hormone-free MS medium for the growth of aseptic seedlings. These aseptic seedlings were used for the production of explants that will be utilized for callus production. Percent of callus and callus growth index were calculated. Methanol extract of callus aseptic seedlings and field samples were analyzed by LC and LC-MS for their isoflavone content (formononetin, biochanin A, daidzein, genistein) of the callus cultures of aseptic seedlings and field samples.

PP-408

Effect of methyl jasmonate on production of ariltetralin lignans in hairy root cultures of *Linum thracicum* ssp. *thracicum*

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Methyl jasmonate (MeJA) treatment increases the levels of plant secondary metabolites, including ariltetraline lignans, which are considered to be the main active compounds in *Linum thracicum ssp. thracicum.* This study was concentrated on the production of ariltetralin lignans in hairy roots cultures of *Linum thracicum ssp. thracicum,* transformed by *Agrobacterium rhyzogenes,* LBA 9402 by exposing them to different concentrations (50-200 μM) of methyl jasmonate (MJ) during the culture period. The lignans podophyllotoxin (PTOX) and 6-methoxypodophyllotoxin (MPTOX) are the main constituents in *Linum thracicum ssp. thracicum.* Lignan content increased two fold by elicitation of MJ, however, the fresh weight, dry weight and growth ratio was strongly inhibited by increasing MJ concentrations. The highest total lignans yield was obtained with 150 μM MJ treatment. These results suggest that MJ elicitation is beneficial for lignan accumulation in the hairy roots cultures of *Linum thracicum ssp. thracicum*.

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Financial support from Medical University of Sofia, Bulgaria (grant 13/2009 I. Ionkova) is acknowledged.

PP-409

In vitro propagation of *scrophularia takesimensis* nakai: A rare endemic medicinal plant

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A protocol was developed for direct regeneration of *Scrophularia takesimensis* using leaf, petiole, and stem explants. The explants were excised from mature field-grown plants and cultured on a Murashige and Skoog (MS) medium with or without plant growth regulators (PGRs). Direct adventitious shoot buds were initiated from explants after two weeks of culture on a MS medium containing different concentrations of PGRs. A combination of cytokinins and auxins produced more shoot buds from leaf, petiole or stem explants than on the medium

containing cytokinins alone. The highest number of shoot buds was obtained on a MS medium supplemented with 3.0 mg L^{-1} 6-(γ-γ-dimethylamino)purine (2iP) and 1.0 mg·L^{-1} indole-3-acetic acid (IAA). The shoot buds were transferred to a half-strength MS medium supplemented with 3% (w/v) sucrose and solidified with 0.8% (w/v) agar for four weeks to induce shoots and roots. Plantlets were transferred to the greenhouse with a 96% survival ratio. A high performance liquid chromatography analysis detected the presence of a harpagoside in the shoot culture and greenhouse-grown plants which were established from *in vitro* culture. Light intensity and plant growth regulators were significantly affected accumulation of harpagoside in shoot culture. The content of harpagoside was high in seeds followed by leaves and roots.

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PP-410

Rapid clonal micropropagation of *withania coagulans* (stocks) dunal: A critically endangered medicinal plant

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Withania coagulans (Solanaceae) is used in the treatment of ulcers, rheumatism, dropsy, consumption and sensile debility. *W. coagulans* is now endangered in their natural habitats. This report describes *in vitro* shoot induction and plant regeneration from nodal segments of *W. coagulans*. Nodal segments measuring 1 to 2 cm in length were excised from 5 year-old plants and cultured on Murashige and Skoog medium fortified with 6-benzyladenine (2-4 mg/L) or indole-3-butyric acid (0.25-0.5 mg/L). Multiple shoots differentiated directly without callus mediation within 3 weeks. The maximum number of shoots (7±0.53 shoots per explant) and elongation (7±0.75cm) were achieved when explants were subcultured on MS media containing 2 mg/L BA in combination with 0.5 mg/L IBA. For rooting, shoots derived were excised and cultured on ½ MS medium with different concentrations of IBA (1, 2 or 4 mg/L) and Kin (1 0r 2 mg/L) alone. Roots appeared by day 30, many were found to be 2.2–4 cm long. The best medium for Rooting was MS medium with 2 mg/L IBA. Rooted plantlets transferred to sterile soil and sand mixture (2:1), showed 85% survival when transferred to the outdoor. The procedure described here *in vitro* micropropagation of *W. coagulans* for first time.

PP-411

The effect of pyrazincarboxylic acids derivatives on the flavonoid production in *ononis arvensis* 1. Culture *In vitro*

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Plant tissue and cell cultures provide model systems for the study of various molecular, physiological, organism and genetic problems. The pyrazine ring is a part of many polycyclic compounds of biological or industrial significance. Pyrazines occur naturally in a wide range of food items, as in heated bread or meat, baked potatoes and coffee. Previous study with these type of elicitors confirmed the increased secondary metabolites production in *Silybum marianum* and *Genista tinctoria in vitro* cultures. *Radix ononidis* is mild diuretic, is also used for gout and rheumatic complains. The effect of compound 1: *N*-(3-iodo-4-methylphenyl)pyrazine-2-carboxamide in 3 concentrations: c_2-2.95.10^{-3}mol/L; c_{2a}-2.95.10^{-4} mol/L and c_{2b}-2.95.10^{-5} mol /L on flavonoid production in callus culture of *Ononis arvensis* was investigated. Elicitor was added to callus culture on the 35th day of cultivation. 6, 12, 24, 48, 72 and 168 hours after elicitor application, the callus tissues were sampled, dried and the content of flavonoid was determined. The effect of elicitation with compound 1 on flavonoid production in callus cultures of *Ononis arvensis* was very small. Statistically significant increase in flavonoid production is reached after 168-hours elicitation at concentration c_2, when the production was increased about 88% compared to control.

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PP-412

Subcritical water extraction of polyphenols (antioxidant compounds) from residual *Thymus vulgaris* leaves in an integrated clean process

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Important bioactive compounds of aromatic herbs are volatiles (essential oil) and non-volatiles (polyphenols). We aim to develop an efficient, clean and optimally integrated process to isolate the essential oil and the phenolic compounds of aromatic herbs. Steam distillation followed by sub-critical water extraction, is a good option to extract essential oils and phenolic compounds in an integrated clean process. In this work we report the optimization of the sub-critical water extraction of polyphenols from residual *Thymus vulgaris* leaves harvested from an organic cultivar. The extracts were obtained at different temperatures and extraction times using an accelerated solvent extraction equipment (ASE 150). The extracts were assessed in their antioxidant capacity by several methods: radical scavenging activity, ferric reducing power, total phenolic and tannin content of the extracts. The extract obtained at 200 °C and 15 minutes showed the higher antioxidant capacity according to all methods tested. This extract has an IC_{50} of free radical of 0.235 mg dry extract/ml, a ferric reducing ability value of 33.7 mg of ascorbic acid equivalents/g of dry plant, a total phenolic content of 158.7 mg of gallic acid equivalents/g of dry plant and total tannin content of 43.82 mg of catechin equivalents/g of dry plant.

PP-413

In vitro cultures of excised roots of *gypsophila* species without phytohormones and saponin accumulation

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For the first time it is shown that excised roots of *Gypsophila* species are able to grow continuously in *in vitro* culture without any phytohormone. A simple and rapid method of excised root cultures from six *Gypsophila* species, established from solid-grown seedlings on MH3 medium, was performed. A markedly increase of biomass was observed in the light by comparison with dark conditions. High percentage of cell lines of *G. trichotoma, G.elegans*, *G. glomerata and G. viscosa* developed main axis root and regular sequence of laterals (4-6 per explant) in the first 2 weeks of cultivation. Significant growth for *G. glomerata* was achieved after 3 weeks on liquid medium; biomass was up to fiftyfold greater than initial root weight and reached 10 g DW *per* explant. The content of triterpene saponins in the roots of *G.elegans* (up to 101 mM/ g DW) was higher than in *Gypsophila paniculata* roots classically found as the best producing ones, whereas the cell lines of *G. glomerata* showed a smaller saponin production (between 2 and 10.9 mM/g). The extracts of excised roots of *Gypsophila glomerata* cultivated in liquid medium had nearly the same HPLC profile as roots of intact plants *Gypsophila paniculata*.

PP-414

Direct and indirect somatic embryogenesis and cardenolides contents in *Digitalis lamarckii* ivan, an endemic species of Anatolia

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We investigated, for the first time, direct and indirect somatic embryogenesis and cardenolides contents from 2-3 weeks-old hypocotyl explants of *Digitalis lamarckii* Ivan., an endemic medicinal plant and commonly known as foxglove which belongs to the family Scrophulariaceae. High frequency direct and indirect somatic embryogenesis was achieved on Murashige and Skoog's (MS) medium supplemented with NAA (0.25 or 0.5 mg/l) + BAP (0.5 mg/l) and NAA (0.5 mg/l) + BAP (1 or 2 mg/l), respectively. Indirect somatic embryos proliferated rapidly in subsequent cultures. Various developmental stages were observed during the maturation of somatic embryos, including globular, heart-shaped, torpedo, and cotyledonary stages. Different samples were used for the determination of five cardinolides; viz. digoxigenin, gitoxigenin, lanatoside C, digoxin, digitoxin as well as total cardinolides content. For the total cordenolides, callus contained 73.42 μg/g, indirect shoots 202.0 μg/g, direct shoots 260.8 μg/g, indirect somatic embryos 136.3 μg/g and direct somatic embryos 385.9 μg/g, respectively.

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PP-415

In vitro multiplication of *Hepatica transsilvanica* fuss.

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One of the endemic species, protected by law in Romania is represented by *Hepatica transsilvanica* Fuss and it is found in Romania, in the Carpathian Mountains (1,2). The paper studies "*in vitro*" behavior of *Hepatica transsilvanica* Fuss. It was tested, not only the dedifferentiation capacity, but also the regenerative potential for rapid micropropagation, as an unconventional alternative to conserve and perpetuate this species. The callus cultures were obtained from foliar explants, on Murashige-Skoog medium (3) with 2mg/l BAP and 0,02 mg/l NAA. The direct caulogenesis were initiated on MS medium, supplemented with 2 mg/l BAP and the entire plants regeneration, through roots development on the MS medium without phytohormones.

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PP-416

In vitro propagation of white dead nettle (*lamium album* l.)

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The genus *Lamium* L. (Lamiaceae) comprises about 40 species of annuals and perennials distributed in Europe, Asia and Africa. Some of them have been used in the official and folk medicine. *Lamium album* L. (white dead nettle) has been applied as astringent, uterotonic, antispasmodic. The micropropagation is an important method for *ex situ* preservation of valuable plant species, especially under extinction and with low fertility. The effect of cytokinin N-6-benzyladenine (BA) on *in vitro* propagation of *Lamium album* L. has been studied. Different concentrations of BA (0,1 – 1,0 mg/L) affected micropropagation and callusogenesis and some physiological features, such as number and length of the shoots, fresh and dry weight. Low concentrations increased the shoot number while higher stimulated callusogenesis. The pharmacological effects of *Lamium album* L. have mainly been attributed to the phenolic substances content. In our model system the application of BA increased the amount of total phenolics.

PP-417

Indirect regeneration of black cumin (*Bunium persicum*), a medicinal plant of Iran

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Iranian black cumin, *Bunium persicum* (Boiss) B. Fedtsch., has been distributed as a known medicinal wild plant in mountain area of Iran, India, Pakistan and Afghanistan. The economical valuable of this plant is related to antioxidant, hypoglycemic, stimulants

and carminatives activities of seeds. In addition, they have been used in treatment of dyspepsia and diarrhea. In fact, high economical value of this medicinal plant is the reason of over and early seed collection by locals. As the result, distribution area of this plant is decreasing yearly. Furthermore, seed dormancy and delay in reproductive stage of seedlings (3-4 years) are reasons of unsuccessful domestication.

Indirect regeneration of *Bunium persicum* has been started with callus induction from root, corm, and leaf segments by a systematic method. MS media supplemented with 1.0 mg/l of dicamba, 2, 4 D, NAA, and picloram. The results show that the minimum callus initiation time for root, leaf, and corm, that is 24.4± .45, 20.3±.64, and 17.7± .6 (days) respectively have been occurred in presence of 1.0 mg/l 2, 4 D on MS media. However, root segments on picloram, leaf segments on NAA, and corm segments on dicambia with the initiation time of 35±.6, 34.8±1.4, and 37.4±.8 days respectively, showed the maximum callus initiation time.

Although, the maximum callus formation from corm and leaf explants was in the presence of 1.0 mg/l 2, 4 D with the 83.3±3.4 % and 86.7±4.3 % respectively, but in the root explants the maximum callus formation , that is 91.4 ± 3.7%, was is in the presence of 1.0 mg/l picloram.

MS media supplemented with 0.6 mg/l kinetin with 34.2±0.6 % shoot formation had the maximum organogenesis. At last, half strength of MS media with 80 % for whole plant regeneration was the most suitable media.

PP-418

Genetic diversity, conservation, and cultivation potential of *Coridothymus capitatus* (l.) Reichenb. Fil. In Jordan

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Coridothymus capitatus (L.) Reichenb. fil. is an aromatic plant growing wild in Jordan. The study comprised fifteen wild populations of *Coridothymus capitatus,* one wild population of *Thymbra spicata* and two *Thymbra. spicata* landraces. The investigated wild populations of *Coridothymus capitatus* showed various degrees of phenotypic variation. Significant variations were obtained for quantitative characters, the coefficient of variation percentage (C.V %) ranged from 12.60 %. to 39.20 %. The average estimate of Shannon's diversity index (*H`*) was 0.58. The genetic distance among pairs of populations was low. Essential oils were quantitatively analyzed using GC/MS techniques. Significant diversity was obtained among wild *Coridothymus capitatus* populations. Thymol percentage ranged from 0.03 to 0.57 %, and carvacrol percentage ranged from 0.10 to 0.90 %. Populations showed average dissimilarity of 10.68. The Unweighted Pair Group Method with Arithmatic Mean (UPGMA) cluster analysis revealed thymol and carvacrol chemotypes. *Coridothymus capitatus* populations introduced for cultivation showed a good stand and potential toward producing dry herbage yield (3046 kg/ha). Cultivated populations showed variation in relation to their essential oil content. Thymol percentage ranged from 0.01 to 0.90 % and carvacrol percentage ranged between 0.10 and 0.87 %. The genetic diversity among cultivated population was estimated at the molecular level using Amplified Fragment Length Polymorphism (AFLP) analysis. A total of 235 bands were scored using ten selective primer combinations. Five groups of *Coridothymus capitatus* were identified by the UPGMA clustering indicating genetic variation among populations.

The results of this study indicate that a broad range of genetic variation exist among populations of *Coridothymus capitatus* collected from wild habitats in Jordan, and among *Thymbra spicata* populations. Seeds of *Coridothymus capitatus* and *Thymbra spicata* were conserved (*ex situ*) in seed bank and in the field bank.

PP-419

Caraway (*Carum carvi* L.) breeding and its herbicide protection

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Caraway (*Carum carvi*, L.) is, as for the area, the most signifiant spice plant bred in field conditions in the Czech Republic. Currently, the caraway area in the Czech Republic is about 2000 ha. However, caraway has very small competitive ability against the most weed varieties. Presently, the caraway is bred both as pure crop and underseeding of other field crops. The herbicide preparations with effectual substance linuron and pendimethalin were steadily evaluated as very selective to caraway plants. In certain years other preparations with effectual substances as imazamox, metolachlor + terbuthylazine and isoxaflutole showed certain problems with selectivity towards caraway plants. In the Czech Republic are two registered species of biennial caraway /Rekord, Prochan/, in the case of winter version there has been no type registered so far. There are more procedures of Caraway breeding. We make use of both standard breeding methods as selection and forced self-fertility and new biotechnological procedures such as creation of caraway dihaploid plants (DH). Self–fertility caraway homozygotion lasts 5-7 generations /10 – 14 years/ and there often occurs an inbred depression / worse plant vitality, lower seed gain and lower HTS/. Caraway dihaplodization method is used for a shortening of this long-time cycle. In Agritec we obtained DH caraway plants from both forms. Nevertheless, a strong inbred depression appears and it distinctly decreases the production of plants ´seeds. We are searching for procedures which would be able to get rid of an inbred depression in the seed production. Our company is testing biennial caraway. These tests are focused on several genotypes of gained selections. We began to work on several tens of genotypes of winter caraway which were selected particularly because of high contain of essential oils.

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PP-420

Phytoplasma disease on *Plantago major* in Serbia

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The member of the family *Plantaginaceae*, wide plantain (*Plantago major*) is an important medicinal plant. The phytoplasma-like symptoms have been observed since 2003 at plantations located in Serbia (Pančevo, Indjija). The first symptom was reddnes of lower leaves, followed by its withering. The new formed leaves expressed the similar symptoms. The diseased plants were stunted and died before the end of vegetation season. The percentage of disease plants was about 90. There are a small number of data concerning the Phytoplasma disease on the plantain. So far, only two reports were published concerning the molecular identification of a phytoplasma disease in *Plantago* spp. in Germany and Czech Republic. In this paper we report the molecular identification of a phytoplasma in naturally infecting wide plantain showing described symptoms. We detected the presence of 16SrXII-A group of phytoplasma on *Plantago major,* using PCR assays with the P1/P7 and P1/16S-SR primer pairs for the amplification of phytoplasma 16S rDNA gene, R16F2n/R16R2 primer pair for nested PCR and RFLP patterns of nested products obtained by restriction endonucleases. This is the first report of the natural occurrence of phytoplasma 16SrXII-A group in *P. major* in Serbia.

PP-421

The use of medicinal plants in traditional therapy of respiratory tract: Etnobotanical experience from Bosnia and Herzegovina

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According to estimates by pathologists worldwide, about 30% of the population is suffering from various lung diseases. This is especially applicable to populations in urban and polluted environments. In a recent survey showed more than 24 000 sick children from one to 16 years of obstrutive lung disease in the wider area of Sarajevo. In the treatment using antibiotics and other pharmacological means, if it comes to acute diseases. However, in chronic lung disease than the classic drugs, often used in various herbal products. Many of them have been used since ancient times in traditional phytotherapy.

In order to find effective herbal means in the prevention and treatment of lung diseases are carried out ethno-botanical research. The method of ethno-botanical interview (150 adults) in various parts of the country, determined by as many as 65 species of plants used in traditional treatment of respiratory organs. Most commonly cited species are: *Plantago major, Primula elatior, Malva sylvestris, Althaea rosea*, *Picea abies, Pinus nigra, Levisticum officinale, Inula helenium,* species of the genus *Thymus, Origanum, Micromeria, Satureja*, and lichens *Lobaria, Cetraria* and *Usnea*. Significant is the use of physiological and reactive species such as *Asarum europaeum, Hyoscyamus albus, Datura stramonium, Atropa bella-donna, Calendula officinalis*.

Most of the overground part of plants is used in the flower, then leaves, root and rhizome. Those plants use to make infusions, decocts, wraps, and "cigarettes."

Many of the plants should be identified and examined through various laboratory pharmacological tests in order to put some of them in the service of official and pharmacotherapy.

PP-422

Medicinal plants of Brunei Darussalam

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Ethnobotanical surveys have revealed that Brunei Darussalam has a rich source of tropical medicinal plants[1]. As 80% of the country's land is covered by tropical rainforest, Brunei Darussalam may have some medicinal plants with unique characteristics of secondary metabolites. Some plants such as *Catharanthus roseus* (L.) G. Don and Eurycoma longifolia Jack have long been used by the local communities to treat various disease conditions. However, no research has been done in terms of the constituents or biological activities of the Brunei Darussalam medicinal plants. We have investigated the genetic variability diversity and pharmacological actions of *Andrographis paniculata* (Burm.f.) Nees[1] also known as Daun Pahit or Chuan Xin Lian or King of Bitters by an interdisciplinary approach, involving DNA-based RAPD and RFLP analyses, HPLC-based chemical analysis as well as cell culture and tissue-based bioassays. We have demonstrated that *Andrographis paniculata* extracts exhibited a range of actions including antioxidant, anti-allergies, anti-inflammatory and anti-cancer effects. Some of the pharmacological actions of *Andrographis paniculata* are co-related with their active constituents Andrographolide (A) and Dehydroandrographolide (D). The study is valued not only in obtaining experimental evidence for supporting traditional use of native medicinal plants but also in establishing a platform for studying other medicinal plants in Brunei Darussalam.

Reference

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PP-423

Determination of steroidal saponins and rutin as biologically active compounds in *Tribulus terrestris* L. By HPLC analysis

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Tribulus terrestris is a summer growing prostrate herb, with long stems, pinnate leaves, small yellow flowers and large spined fruit. It is widely distributed annual plants in the worm regions all over the world. The herb is used by many different ethnic communities, Bulgaria, India, China, to treat male and female sexual dysfunctions, oedemas, abdominal distention and cardiovascular diseases. *Tribulus terrestris* growing in Bulgaria is a source for the industrial production of the original preparations. A separation by high performance liquid chromatography (HPLC) was realized by using a reversed-phase (ODS-2, Inertsil) column, UV detection (at 203 nm), and a water/acetonitrile gradient as the mobile phase. The HPLC screening of the biologically active compounds – steroidal saponins and rutin from Bulgaria, Turkey and Hungary has been reported.

PP-424

Comparison of planting date seasons effects on agronomic characters and essential oil of dill (*Anethum graveolens* l.)

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In order to comparison of biological and seed yield, essential oil quality and quantity and of dill (*Anethum graveolens* L.) in 3 planting date seasons, a completely randomized design with three replications was conducted in 2006 - 2007 in Esfahan province. Essential oil was obtained by Clevenger and recognized by GC-Mass and GC. According to results, the majority of seedlings were injured in autumn planting date (November) and effect of planting date seasons on fresh and dry biological yields, essential oil of foliage were significant. In spring (March) and summer (June) fresh and dry biological yields were 5.4, 1.1 kg/m^2 and 3.7, 0.8 kg/m^2, respectively and also essential oil quantity were 10.2 and 5.3 cc/m^2 respectively. The most important components in the essence were carvone with 58.5 and 52.2 % in spring and summer respectively. Thus, cultivation of dill in spring and summer season date in order to produce seed, foliage and essential oil was successful.

PP-425

Subcritical water extraction of polyphenols (antioxidant compounds) from residual *Thymus vulgaris* leaves in an integrated clean process

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Important bioactive compounds of aromatic herbs are volatiles (essential oil) and non-volatiles (polyphenols). We aim to develop an efficient, clean and optimally integrated process to isolate the essential oil and the phenolic compounds of aromatic herbs. Steam distillation followed by sub-critical water extraction, is a good option to extract essential oils and phenolic compounds in an integrated clean process. In this work we report the optimization of the sub-critical water extraction of polyphenols from residual *Thymus vulgaris* leaves harvested from an organic cultivar. The extracts were obtained at different temperatures and extraction times using an accelerated solvent extraction equipment (ASE 150). The extracts were assessed in their antioxidant capacity by several methods: radical scavenging activity, ferric reducing power, total phenolic and tannin content of the extracts. The extract obtained at 200°C and 15 minutes showed the higher antioxidant capacity according to all methods tested. This extract has an IC_{50} of free radical of 0.235 mg dry extract/ml, a ferric reducing ability value of 33.7 mg of ascorbic acid equivalents/g of dry plant, a total phenolic content of 158.7 mg of gallic acid equivalents/g of dry plant and total tannin content of 43.82 mg of catechin equivalents/g of dry plant.