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**Supplementary Issue - Abstracts of
"11th International Ethnobotany Symposium",
November 2-5, 2013, Antalya, Turkey**

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WELCOME MESSAGE



Dear Colleagues and Participants,

On behalf of our organizing committee, it gives me a great pleasure and honor to welcome you to the “**11th Annual Congress of International Ethnobotany Symposio**”, which will be held in Antalya, Turkey hosted by **Paloma Renaissance Resort on November 2-5, 2013**.

The congress has been supported by the University for Peace Foundation; this international symposium will be the 11th of the series. On this occasion, we would like to express our sincere thanks to the President and all members of the Foundation for giving the honorable opportunity to organize 11th International Ethnobotany Symposium in Turkey.

The conference was held periodically in Latin America, gathering a vast collection of papers, contributions and experience on the various fields of Ethnobotany and allied disciplines. It is our great pleasure to organize this special international symposium in Antalya/Turkey in 2013. Although the symposium emphasizes “Ethnobotany and allied fields”, the conference will be a real environment for scientists and participants from all over the world working on the related fields. Hence, the 11th International Ethnobotany Symposio will constitute a global platform open to all researchers of any nationality, who would like to present their relevant studies as well as to build new collaborations and friendship among participants.

Turkey, as a country where two continents (Europe and Asia) meets, has a great biodiversity, most of them are endemics, as well as an interesting fauna depending on location are surrounding three different seas. The conference location, Antalya (ancient Pamphilia), provides special additional cultural merits as well as natural beauty. Antalya is also a conference center and a holiday resort, and is called as “Turkish Riviera” on the coast of Mediterranean sea. So, we are happy to invite all participants to meet in this amazing area.

Ethnobotany, a newly –emerged interdisciplinary research area between social and natural sciences, looks into relationship between mankind and plants. Turkey, a country with a history of almost 8000 years and many civilizations, has a rich traditional knowledge and practices on the sustainable use of biodiversity. Moreover, the research results of ethnobotany have proven the solid foundation and wide application of the traditional knowledge.

The conference will cover the topics of folk traditions, archaeobotany, palaeobotany, geobotany, history of medicine, ethnomedicine, ethnomedicinal approach to modern primary health attention, and emphasis on ethnopsychiatry (environment, therapies), plants and global warming, sustainable development in ethnopharmacology, traditional medicine, medicinal and aromatic plants including cultivation, processing and conservation from the past to present, natural product chemistry and biological activity, plant biotechnology will also be among the topics which will be focused in the conference.

The symposium covers 11 plenary lectures, and 4 invited lectures, 30 oral presentations, about 200 posters by many eminent scientists from around the world. We have also special effort to bring young researchers from different countries, and from different regions of Turkey. Furthermore, we have also organized many social programs for the participants to have a good time and relax after the intensity of the day sessions with live music performances, folkloric dancers and by tasting special Turkish cuisine. We are most fortunate to have generous support from many national and international organizations and commercial enterprises.

As a final word, we aim to have an effective and fruitful congress with the hope to refresh our professional knowledge and also have a good time together. In advance, I would like to extend many thanks to all my colleagues who attend the symposium, for their great interest and support. We wish you will remember the times you spent in Antalya with wonderful memories.

We are so happy to see and host you in Antalya.

Best wishes for an enjoyable and successful conference.



Assoc. Prof. Alev TOSUN

Chairperson of the 11th International Ethnobotany Symposio, Antalya, Turkey

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SCIENTIFIC PROGRAMME of XI. INTERNATIONAL ETHNOBOTANY SYMPOSIUM

November 2-5, 2013

Paloma Renaissance Beach & Resort Hotel

Antalya-TURKEY

SATURDAY, November 2, 2013

09:00-17:00 Arrival to the Hotel and Registration
19:00-21:00 Opening Reception

SUNDAY, November 3, 2013

8:00-9:00 Registration
9:00-9:45 Opening Ceremony and Welcome Remarks

SESSION I

Chair: Jiradej Manosroi

09:45-10:30 PL-1 F. Ertuğ (Turkey)
Anatolian Heritage of Plant Use
10:30-10:45 COFFEE BREAK

SESSION II

Chairs: Aranya Manosroi, A. A. Carbonell-Barrachina

10:45-11:30 PL-2 J. Manosroi (Thailand)
Drug Discovery from Thai Medicinal Plant Recipe Database "MANOSROI III"
11:30-12:00 IL 1 H. Ahmad (Pakistan)
Historical Development and the Present Status of Ethnobotany in Pakistan
12:00-12:15 OP-1 A. Mat
History of Opium in Ottoman Empire
12:15-12:30 OP-2 S. A. Gilani, S. K. Sherwani, R. A. Qureshi
Ethnobotanical Plant Diversity with Special Reference to the Socio-Economic Impact on the
Lives of Indigenous People in Cholistan Desert, Pakistan
12:30-13:30 LUNCH

SESSION III

Chairs: Ronald Chaves, K. P. Gupta

13:30-14:15 PL-3 A. Manosroi (Thailand)
Ethnobotanical Products for Health and Beauty from Thai Medicinal Plant Recipe Database
"MANOSROI III"
14:15-14:45 IL-2 T.v. Dávid, Agnes Toreki (Hungary)
Holistic TCM Cancer Therapy CoD™ CR Ortomolecular Cancer Therapy System®
14:45-15:00 OP-3 V. Upadhya, H. V. Hegde, S. Bhatand, S. D. Kholkute
Knowledge and Attitude of Folk Healers in North-Central Western Ghats of India
15:00-15:15 OP-4 A. M. Ali, R. Adawiyah Ramli, A. Alwi, N. Mat
In-vitro Antioxidant and Alpha-Amylase and Alfa-Galactosidase Inhibitory Activities of
Methanolic Leaf Extracts of *Ficus deltoidea* Jack Varieties
15:15-15:30 OP-5 H. Sher
Women's Indigenous Knowledge of Folk Medicines
15:30-15:45 OP-6 E. Özdemir, Ş. Kültür
Ayurvedic Medicinal Plants Growing in Turkey

15:45-16:00 COFFEE BREAK

SESSION IV

Chairs: Fusun Ertuğ, Habib Ahmad

- 16:00-16:45 **PL-4 C. B. Salunkhe (India)**
Northern Western Ghats, India: A Rich Repository of Ethnobotanical Knowledge and Medicinal Plants
- 16:45-17:15 **IL-3 K. P. Gupta (India)**
Compounds of Natural, Plant or Algal Origin Prevent the Tumor Growth
- 17:15-17:30 **OP-7 F.C. Saputri, A. Mun'im, D. Lukmanto**
Inhibition of Angiotensin Converting Enzyme (ACE) Activity by Selected Medicinal Plant
- 17:30-17:45 **OP-8 R. Karatepe, Z. Ulker, L. Alpsoy**
Genotoxic and Cytotoxic Effects of *Prunus armeniaca* Seed Extract *in vitro*
- 17:45-18:00 **OP-9 N. Mat, M. Samsuddin, N. Arumugam, N. Fatihah, H. Nudin, M. Azhar, A. Wahid, N., Atiqah, M. Yusof, S. Nor, I. Omar, A. M. Ali**
Ethnobotany of *Dioscorea hispida* Dennst. (*Ubi Gadong*) in the State of Terengganu, Malaysia
- 18:00-18:15 **OP-10 A. D. Koca, Ş. Yıldırım**
Ethnobotanical Properties of Blacksea Region: On Emphasis of Akçakoca (Düzce) District
- 18:15-19:15 **POSTER SESSION I**
- 19:15-12:00 **FREE EVENING (Dinner is available in Hotel's Restaurant)**
(PUB PARTY in the Hotel AND MEETING WITH PLENARY SPEAKERS)

MONDAY, November 4, 2013

SESSION V

Chairs: Mahmut Miski, Yeong Shik Kim

- 09:00-09:45 **PL-5 L. Rastrelli, A.L. Piccinelli (Italy)**
Different Approaches to Study Medicinal Plants
- 09:45-10:15 **IL-4 S. Ślusarczyk, J. Tomaszewska, Y. S. Kichimasova, A. Matkowski (Poland)**
Red and Healthy-On Phytochemistry and Bioactivity of Tanshinones
- 10:15-10:30 **OP-11 A. M. Gençler Özkan, Z.C. Arituluk, G. Ekşi**
Medicinal and Refreshing Herbal Teas Commonly Used in Turkey
- 10:30-10:45 **OP-12 D. P. Crandall**
Understanding the Role of Plant Medicines within Himba Conceptions of Health and Illness
- 10:45-11:00 **OP-13 E. Pinto, C. Turco**
Evolution and Changes in the Mediterranean Landscape, the Case of Palms
- 11:00-11:15 **COFFEE BREAK**

SESSION VI

Chairs: Chandrakant B. Salunkhe, Neşe Kırimer

- 11:15-12:00 **PL-6 A. A. Carbonell-Barrachina, A. Calín-Sánchez, P. N. Nuncio-Jáuregui, M. J. Frutos-Fernández, F. Burló, F. Hernández-García (Spain)**
Healthy Information on Pomegranate (*Punica granatum* L.): Fresh Fruit and Juice
- 12:00-12:15 **OP-14 G. Bulut, E. Tuzlacı**
The Ethnobotanical Investigations in Bayramiç (Çanakkale-Turkey)
- 12:15-12:30 **OP-15 P. Ramadanil, F. Fathurrahman, M. Andriany, E. Yuniati**
Advances in Ethnobotanical Research in Central Sulawesi Indonesia
- 12:30-12:45 **OP-16 D. Bravo Avilez, B. Rendon Aguilar, J.A. Zavala Hurtado, J. E. Fornoni Agnelli**
Effect of Herbivore Damage on Fitness in Two Columnar Cacti of Mexico with Different Forms of Management
- 12:45-13:00 **OP-17 G. Bulut, İ. Şenkardeş, A. Doğan, E. Tuzlacı**
The Folk Medicinal Plants of Antalya (Turkey)
- 13:00-14:00 **LUNCH**

SESSION VII

Chairs: Luca Rastrelli, Adam Matkowski

- 14:00-14:45** **PL-7** **M. Miski (Turkey)**
How to Discover the Next Blockbuster Drug in Natural Resources; A Phytochemist's
Adventures in Big-Pharma Land
- 14:45-15:00** **OP-18** **A. Latif, K. Hussain, N. I. Bukhari, M. Islam, A. Ullah, M. K. A. Khan, R. Anwar, T. A. Khan, S. S. Hassan, B. Ahmad**
Glutathione S-Transferases Specific Activity, Acute Oral Toxicity and in vivo
Hepatoprotective Effects of Kanji
- 15:00-15:15** **OP-19** **D. Bendjeddou, K. Lalaoui**
Anti-Tumor Activity of Some Plant Polysaccharides
- 15:15-15:30** **OP-20** **Y. Yeşil**
An Ethnobotanical Collection in Turkey
- 15:30-15:45** **OP-21** **A. Mun'im, M. Utami Puteri, A. Ahwati**
Antianemia Study of *Moringa oleifera* Lamk. Leaves Extract on Aniline-Induced White
Female Rats

15:45-16:00 **COFFEE BREAK**

SESSION VIII

Chairs: A. M. Abd El-Aty, Afife Mat

- 16:00-16:45** **PL-8** **J. Shen, Z. Wang, N. Wang, J. Chen (China)**
Bioactivity Guided Drug Discovery from *Spatholobus suberectus* Targeting Glycolysis for
Breast Cancer Treatment
- 16:45-17:00** **OP-22** **J. Bzour, S. Oran, M. Khaleel, S. Mashallah, Y. Bustanji**
Inhibitory Effects of Methanolic Extracts of *Salvia fruticosa* Mill. on Pro-inflammatory
Cytokines Production in RAW 264.7 in vitro Cellular Model and in BALB/C Mice in vivo
Model
- 17:00-17:15** **OP-23** **R. Zahid Abbas, Z. Iqbal, A. Raza, A. Abbas, M. Hayat, K. Hussain**
Anticoccidial Potential Of *Pinus radiata* Bark in Broiler Chickens
- 17:15-17:30** **OP-24** **Z. Jamal, M. R. Awan**
Ethnobotany and Conservation Status of Some Traditionally Valued Plants of Kaghan Valley,
Mansehra, Kpk, Pakistan
- 17:30-17:45** **OP-25** **R. Belhattab, B. A. Farah**
Biological Activities of *Phoenix dactylefera* Growing in Algeria
- 17:45-18:00** **OP-26** **R. Farhodi, M. A. Mehrnia**
Antioxidant Activities and Bioactive Compounds of Five Jalopeno Peppers
(*Capsicum annum* L.) Cultivars
- 18:00-19:00** **POSTER SESSION II**
- 20:00-12:00** **GALA DINNER**
(RENAISSANCE BEACH RESORT HOTEL BALLROOM WITH LIVE MUSIC)

TUESDAY, November 5, 2013

SESSION IX

Chairs: Jiangang Shen, Zohara Yaniv

- 09:00-09:45** **PL-9** **Y. S. Kim, J. Chun, H. P. Kim (South Korea)**
Saponins from The Roots of *Platycodon grandiflorum* and Their Anticancer Activities
- 09:45-10:30** **PL-10** **X. Liu, A.M. Abd El-Aty, S. JH (Egypt)**
Does the Extraction and Analytical Tool Affect on the Isolation and Identification of Secondary Metabolites from Various Cultivars of *Nigella Sativa*? Potential Effect on CYP 1A Activity
- 10:30-10:45** **OP-27** **S. Ullah, A. Bano**
Characterisation of Biologically Active Constituents of *Suaeda fruticosa*

10:45-11:00 COFFEE BREAK

SESSION X

Chairs: David Crandall, Nouredin Djebli

- 11:00-11:45** **PL-11** **R. Chaves, W. F. de Oliveira, H. Ochoa Torres, Uriel Bacharach (Costa Rica)**
An Approach to Homeostasis and Medicinal Plants Use Case Studies: Glukemia and Alzheimer
- 11:45:12:00** **OP-28** **Z. Y. Bachrach**
Ethnic Medicine and Traditional Medications of Ethiopian and Yemenite Communities in Israel
- 12:00-12:15** **OP-29** **J.-S. Yi, Y. Li, E. J. Cheong, and Y.-E. Choi**
Strategy for Conservation, Restoration, and Utilization of Rare and Endangered Plants-a Case of Cooperative Project for Wild Korean Ginseng (*Panax ginseng* C. A. Meyer)
- 12:15-12:30** **OP-30** **Ren Li, Yuan-fei Wang, Qian Sun, Hua-bin Hu**
Chemical Composition and Antimicrobial Activity of the Essential oil from Maqian (*Zanthoxylum myriacanthum* var. *pubescens* (huang) huang) in Xishuangbanna

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20:00-10:00 **Dinner///Evening Free**

WEDNESDAY, November 6, 2013

GUEST DEPARTURE

ACKNOWLEDGEMENT

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Antalya-TURKEY

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PLENARY LECTURES

PL-1 ANATOLIAN HERITAGE OF PLANT USE

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The contemporary people of Anatolia inherited an immense knowledge of plant use from its geographically, biologically and culturally rich past. While forming a bridge and a natural route between Europe and Southwest Asia, Anatolia has also provided shelter for plants and animals as well as humans. Many genera and sections have their centre of diversity in Anatolia. Species endemism is high due to climatic and topographic diversity, and the limited extent of Pleistocene glaciations. Above all, human factor has probably made the fundamental impact on this diversity. The “Neolithic Revolution”, accomplished by the early inhabitants of Anatolia about 12.000 years ago has left many landraces of these early cultivars. We have recently become conscious of all this plant related heritage, and are trying to record its various facades with great appreciation. In the past people has used plants as their main food, medicine, fuel and fodder source. They have created their shelters, clothes, transportation vehicles and crafted a wide range of daily objects from them. While these practical uses of plants were more prominent, their use for artistic, ritualistic expressions and as cultural symbols of identity was not easily visible. This heritage passed through many generations of men and women from countless ethnic groups, religions, ways of life and it helped them all to survive and create various civilizations here. Each group and generation used rich plant diversity of Anatolia and enriched it by manipulating plants in many ways, e.g. selecting, domesticating, cultivating, pruning, grafting or just collecting them. So, the rich ‘Anatolian heritage of plant use’ can be considered as an accumulation of experiences and ways of manipulations of various generations. It is a multi-layered heritage and we need to include as much multidisciplinary approach and specialists from many disciplines as possible to record this wealth. Until the 1990s, most fieldwork that had been conducted in Anatolia was related to medicinal plants. We haven’t even had a chance to estimate the number and potential of useful plants available around a settlement. Wild plant usages as food, fodder, fuel, handicrafts, as well as their symbolic applications, cultural meanings were neglected. In the last two decades not only the number and the quality of ethnobotanical studies increased, but also their contextual perspective has been gaining depth and started to shed some light over various and multi uses of plants. From among a total of 11.466 taxa of the flora of Turkey over 1000 of it has

been recorded as medicinal, and c.1200 taxon as food. There are some overlaps between these two uses, as medicine and food are considered as complimentary to each other. Over the last 80 years the number of ethnobotanical publications reached to 1400, about one third of them can be considered as folkloric studies. These folkloric studies may not provide scientific names of plants and/or compiled in a systematic way, but provide valuable information about local names and insights about some forgotten uses. Our grandmothers transmit this vast ethnobotanical heritage, and many of these lineage plants can continue to be useful to many generations. However, there are urgent threats both over this heritage and the biodiversity, such as rapid modernization, migration to towns, and changing social relations. The main challenge in front of us now is recording this long-established and unique heritage for future generations before it get disappeared.

PL-2 DRUG DISCOVERY FROM THAI MEDICINAL PLANT RECIPE DATABASE “MANOSROI III”

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Several modern drugs have been developed from plants such as paclitaxel, an anti-cancer drug from *Taxus brevifolia*; reserpine, an anti-hypertensive drug from *Rauwolfia serpentina*; and cinnamon, a dietary supplement for diabetes from *Cinnamomum aromaticum*. Thai folklore medicinal plant recipes have been recorded as textbooks in palm leaves, *Streblus asper* paper, mulberry pulp paper. A large number of recipes from all regions of Thailand were collected, selected, translated from Lanna and the native Thai language to the modern Thai language and recorded into Thai medicinal plant recipe database “MANOSROI III”. At present, MANOSROI III contains 72.426 recipes out of 200.000 expected recipes, covering several diseases such as cancer, hypertension and diabetes. The recipes were preliminary selected for biological activities screening using proper technique such as statistics and scientific evidences. For anti-cancer activity, recipes nos. NE028, N040, N092 and N036 showed the highest anti-proliferative activity in KB (human mouth epidermal carcinoma), HeLa (human cervical adenocarcinoma), HT-29 (human colon adenocarcinoma) and Hep G2 (human hepatocellular carcinoma) cell lines which were about 1.34, 31.09, 0.78 and 14.92 folds of cisplatin,

respectively. In HeLa xenograft nude mice model, when the mice was orally given the recipe no. N040 at the dose of 44.50 mg/kg/day the maximum inhibition of 57.23 % was observed which 0.65 fold of cisplatin, the standard drug was. In addition, brazilin, one of the active compounds isolated from the recipe N040, showed potent anti-proliferative activity on HeLa cell which was about 12.21 folds of cisplatin. For anti-hypertensive activity, recipe no. HT004 showed anti-hypertensive activity which were about 2 folds of prazosin, a standard anti-hypertensive drug. For anti-diabetic activity, the recipe no. RCX1 showed potent anti-diabetic activity which was about 0.98 and 1.54 folds of insulin and glibenclamide, respectively. The results from this study can be used for the further development of novel anti-cancer, anti-hypertensive and anti-diabetic drugs.

PL-3 ETHNOBOTANICAL PRODUCTS FOR HEALTH AND BEAUTY FROM THAI MEDICINAL PLANT RECIPE DATABASE “MANOSROI III”

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Thai Lanna region has its own folklore wisdoms in various fields including traditional medicines for health and beauty. The medicinal plant recipes were recorded in the dead script “Lanna script” in palm leaves, mulberry pulp paper or Siamese rough bush paper. The recipes were recorded in the “Lanna Medicinal Plant Textbook Database: Recipes-Disease-Medicinal Plant” program (Manosroi database). Recently, the total of 53 text books with 75.666 recipes, 3.799 diseases and 8.209 medicinal plants are now recorded in the database. Numbers of recipes for health and beauty such as anti-aging, whitening, sunscreen, body slimming, anti-insomnia and aphrodisiac can be searched from this database using the keywords. However, many bioactive compounds in plants are not chemical stable from light and oxidation, have skin irritation and low permeation which can be solved by using new technologies such as nanovesicles. Nanovesicles, including liposomes and niosomes, are bilayer vesicles composing of phospholipids or non-ionic surfactants which can entrap both water and oil soluble substances. The recent elastic niosomes are the novel topical delivery systems which have high flexibility to squeeze themselves through the skin pores even much smaller than their diameters. Several products for health and beauty have been developed from the Thai medicinal plant recipes selected from the “Manosroi” database and the Thai folklore wisdoms. The selected recipes for anti-aging, freckle reduction or whitening and hair loss

prevention recipes have been tested for free radical scavenging and tyrosinase inhibition for the application in menopause women. The extract from *Terminalia chebula* gall (called “Kot Phung Pla” in Thai and frequently found in many rejuvenile and longevity recipes) showed anti-aging potential activity because of its high DPPH radical scavenging activity, cell stimulative effect and MMP-2 inhibition on normal human skin fibroblasts. The White Kwao Krua (*Pueraria mirifica*, a Thai plant used for rejuvenile for over 700 years) extract has been developed as cosmetics for anti-hair loss and hair darkening due to its 5 α -reductase inhibition and melanogenesis induction. The topical formulations containing the bioactives from rice bran (which is usually appeared in many recipes for health and beauty) loaded in niosomes gave high hydration enhancement and the improvement of skin lightening, thickness, roughness and elasticity. Anti-aging formulations including gel, serum and essences were developed from the fermented Thai Jasmine rice according to the traditional dessert for health. All formulations containing fermented rice sap loaded in niosomes gave anti-wrinkle performance with no irritation in 30 human volunteers. This presentation has demonstrated the commercial potential of several ethnobotanical products for health and beauty from “Manosroi” database.

PL-4 NORTHERN WESTERN GHATS, INDIA: A RICH REPOSITORY OF ETHNOBOTANICAL KNOWLEDGE AND MEDICINAL PLANTS

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Western Ghats are the chain of mountains and have unique geological, cultural and aesthetic values. The region is recognized globally due its rich biological diversity and is one of the ten ‘Hottest hotspots’ of biodiversity. Out of 17.000 species of flowering plants reported to occur within India, Western Ghats harbors over 4000 species of flowering plants. Over 600 flowering plant species from Western Ghats are used either in folk medicines or in Ayurvedic treatments. In Western Ghats, there are two mega centers of biodiversity which includes Southern Western Ghats and Northern Western Ghats. The Northern Western Ghats, popularly known as Sahyadris about 750 km in length starts below river Tapti’s mouth and run upto Goa state. These mountain ranges has spectacular array of evergreen forests, grasslands, perennial rivers, valleys and lateritic plateaus. It has the most important and crucial natural habitats with repositories of genetic diversity of endemic and valuable plant species. This region is endowed with rich diversity of medicinal and aromatic plants of

outstanding universal value and harbor germ plasm of wild indigenous flowering plant species. The medicinal plants and indigenous underutilized plants of Northern Western Ghats have great potential to contribute significantly in improving health and nutrition, livelihoods, household food security and ecological sustainability. The Sacred groves located in these ranges are protected by local communities and are the most important reservoirs of medicinal plant diversity. Traditional knowledge about medicinal plants is one of the precious cultural heritage parts of India that involves the interaction between plants and people. Traditional healers, herbal practitioners, vaidyas and tribal's living in close harmony with Northern Western Ghats have sound knowledge of herbal remedies to cure various chronic diseases related to arthritis, asthma, diabetes, kidney problems, rheumatism and skin infections. This traditional knowledge of medicinal plants is unique and has been passed from generation to generation, usually by word of mouth and cultural rituals. It forms the basis of health care of rural peoples. Today, there is a grave risk that this valuable indigenous knowledge of herbals will be lost in the near future. The documentation of this un-coded, oral traditional knowledge of medicinal plants is very much essential. Preliminary floristic diversity survey of some areas and sacred groves and documentation of traditional knowledge of medicinal plants from selected areas of Northern Western Ghats has been done as the first step to build basic information source. Documentation of ethnobotanical knowledge and promotion of sustainable utilization of medicinal plants of Northern Western Ghats are the important solutions need to be addressed to all stakeholders in view of adaptation to climate change and environment protection. Health care, urbanization and climate change are the major challenges of Asia-Pacific region. Medicinal and aromatic plants will play crucial role in solving these problems. Inventorization, assessment and mapping of the available genetic resources of promising medicinal plants from different climatic zones and documentation of ethnobotanical knowledge will greatly help to achieve UN Millennium Development Goals by 2020, particularly in combating hidden hunger, offering health care and income generation options.

PL-5 DIFFERENT APPROACHES to STUDY MEDICINAL PLANTS

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The present lecture will provide descriptions of different approaches used by our group to investigate the overall chemical profile of complex vegetal matrices.

Instrumental techniques used have shown to be complementary: NMR has shown to be a quick and informative tool for the rapid analysis of crude extracts, allowing the identification of the main class of secondary metabolites, and indispensable for structure determination of pure compounds including their stereochemistry. The ESI-MS approach also provided abundant structural information and has proven to be a good method for the structural characteristic and identification of a lot of natural compounds, while the use of hyphenated techniques such as HPLC/MS and HPLC/MS/MS allows performing on line composition and structural analyses and can greatly improve the analytical selectivity and sensitivity. Following will be presented different approaches and methods, developed in our laboratories, for the study of complex plant extracts of species belonging to the family of Guttiferae (*Clusia*, *Garcinia* and *Calophyllum* spp) as well as samples of tropical propolis collected in Cuba, Brazil, Honduras and Mexico. Many compounds are reported using a combination of NMR, ESI-MS, HPLC-PDA, GC-MS and HPLC-ESI-MS techniques.

PL-6 HEALTHY INFORMATION ON POMEGRANATE (*Punica granatum* L.): FRESH FRUIT AND JUICE

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Pomegranate (*Punica granatum* L.) has been widely consumed in many cultures for thousands of years; the role of pomegranate on folk medicine has been largely established: (i) Babylonians considered pomegranate arils as resurrection agent; (ii) Persians believed they conferred invincibility on the battle fields, and (iii) in ancient China, pomegranate symbolized longevity and immortality. In recent years a notable increase in scientific support has occurred. Now, pomegranates are a well-known source of many valuable substances, such as ellagitannins (punicalagins and punicalins), condensed tannins (proanthocyanidins), anthocyanins, phenolic acids (ellagic acid), and organic acids. All these compounds show high antioxidant activity and induce "potential" health benefits against cancer, cardiovascular diseases, among others. However, the manufacturing of pomegranate juices, the most popular pomegranate-based product, and its storage

produce significant changes on its physico-chemical and bio-active composition of pomegranate and consequently in its health effects. In the human body, ellagitannins are metabolized into urolithins, which also display a broad array of chemopreventive properties. Considering this information, it can be considered that *in vitro* assays with punicalagins and ellagic acid are not fully representative of pomegranate health benefits. However, this does not mean that pomegranate has no positive effects but that mechanisms of action in the human body need further research to be fully described and understood. The bioactive composition of pomegranate fruits and pomegranate-based products will be reviewed and their positive effects on: oxidative stress, cardiovascular diseases, cancer, neurological disorders, antimicrobial activity and other diseases will be described. Some myths will also be exposed, such as the presence of steroid hormones. Finally, the most recent medical studies reporting the clinical effects of a diet rich in pomegranate in animals and humans will be presented.

To conclude some information about consumers' preferences regarding pomegranate juices in different countries will be presented. This information will be of utmost importance for companies marketing pomegranate products "internationally".

PL-7
HOW TO DISCOVER THE NEXT BLOCKBUSTER DRUG IN NATURAL RESOURCES; A PHYTOCHEMIST'S ADVENTURES IN BIG-PHARMA LAND

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Secondary metabolites produced by plants, microorganisms and marine organisms do not directly influence their survival, however, these compounds play critical role in the environmental interactions of the producing organisms by exerting variety of biological activities such as antifeedant, anti-fungal, antibacterial and allelopathy. Secondary metabolites were the products of a complex genetical-epigenetical evolutionary process, their structures specifically designed to interfere with the biological cycles of parasitic species through the vital receptor and/or enzyme activation-inhibition processes to defend producing organisms. The structural diversity and complexity of secondary metabolites are still unrivaled in comparison with the compound libraries created by combinatorial chemistry and classic synthetic chemistry. Since these compounds were intentionally created to interfere with the biological activities of crucial macromolecules, potentially they could interact with the

analogous macromolecules that play key role in the development and progress of certain disease states. Development and advancement of the molecular biology and biotechnology techniques have enabled establishment and evolution of selective bioassay techniques to identify potential drug candidates to address unmet medical needs such as the treatment of various cancer types, autoimmune diseases, drug resistant infectious diseases, metabolic and geriatric diseases. Introduction of the use of mechanism-based high-throughput screening for bioassay-guided fractionation has revolutionized the natural products based drug discovery programs. Although alternative drug discovery programs such as combinatorial chemistry has drained away resources from the natural products research programs in major pharmaceutical companies, there is a renewed interest in natural products based drug discovery programs and natural products still provide a good proportion of the new chemical entities entered into the drug development programs as well as new drug launches. Furthermore, establishment of a rational natural product research program with preliminary ethnobotanical/ethnopharmacological database screening and effective use of dereplication processes could vastly improve the success of natural products based drug discovery program.

PL-8
BIOACTIVITY GUIDED DRUG DISCOVERY FROM *SPATHOLOBUS SUBERECTUS* TARGETING GLYCOLYSIS FOR BREAST CANCER TREATMENT

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Cancer cells have different metabolic properties from normal cells. Other than relying upon mitochondrial oxidative phosphorylation to produce energy, cancer cells have developed an altered metabolism that allows them to sustain higher proliferation rates. Cancer cells predominantly produce energy by glycolysis even in the presence of oxygen. This alternative metabolic characteristic is known as the "Warburg Effect." Recent progress indicates that glycolytic pathway of cancer cells could be a critical target for drug discovery. Lactate dehydrogenase A (LDH-A) is one of the targets of glycolytic pathway and emerges as a novel therapeutic target for cancer treatment. *Spatholobus suberectus* (SS) is a common herbal medicine used in China for treating cancer and cardiovascular diseases. In this presentation, I will introduce our recent progress in the studies of SS and its active compounds for LDH-A inhibition on breast

cancer. We found that SS manifested apoptosis-inducing, cell cycle arresting and anti-LDH-A activities in both estrogen-dependent human MCF-7 cells and estrogen-independent MDA-MB-231 cell. Oral herbal extracts (1 g/kg/d) administration attenuated tumor growth and LDH-A expression in both breast cancer xenografts. Bioactivity-guided fractionation finally identified epigallocatechin as a key compound in SS inhibiting LDH-A activity. Further studies revealed that epigallocatechin is one of the compounds of SS in mediating LDH-A inhibition and inducing apoptosis. The mechanisms were attributed to disassociation of Hsp90 from HIF-1 α and subsequent accelerated HIF-1 α proteasome degradation. *In vivo* study also demonstrated that epigallocatechin could significantly inhibit breast cancer growth, HIF-1 α /LDH-A expression and trigger apoptosis without bringing toxic effects. The preclinical study suggests that the potential medicinal application of SS for inhibiting cancer LDH-A activity and the possibility to consider epigallocatechin as a lead compound to develop LDH-A inhibitors. In addition, we found that ISL, an active compound from SS, induced apoptosis and inhibited LDH-A expression and activity in breast cancer cells *in vitro* and *in vivo*. ISL synergistically interacted with chemotherapeutic agents to induce cancer cell death. In conclusion, inhibiting metabolic targets is an important strategy for cancer treatment. Combination of TCM with conventional therapies would provide an attractive strategy for improving clinical outcome in cancer treatment.

PL-9 SAPONINS FROM THE ROOTS OF *PLATYCODON GRANDIFLORUM* AND THEIR ANTICANCER ACTIVITIES

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The *Platycodon* saponins (PS) of the root of *Platycodon grandiflorum* (Platycodi Radix) are known to have diverse biological activities, exerting anti-inflammation, anti-allergy, anti-tumor, anti-obesity, and anti-hyperlipidemia effects. To isolate six bioactive PS (platycoside E, platycodin D₃, platycodin D, and each deapiose structure) on a preparative scale, high-speed counter-current chromatography (HSCCC) was performed using a two-phase solvent system composed of hexane-*n*-butanol-water (1:40:20, v/v) and (1:10:5, v/v), in combination with effluent monitoring by evaporative light scattering detection. Minor saponins, acetylated isomers of the

major saponin, were also isolated using a multi-step process including high-speed counter-current chromatography (HSCCC) and preparative reversed-phase high-performance liquid chromatography (HPLC). After the separation of the major components, the enriched minor saponin fraction was used for this study. A two-phase solvent system consisting of chloroform-methanol-isopropanol-water (3:2:2:3, v/v) was used for HSCCC. HSCCC fractions were further purified by preparative reversed-phase HPLC, yielding 3''-*O*-acetylplatycodin D, polygalacin D, 2''-*O*-acetylplatycodin D, 3''-*O*-acetylpolygalacin D, and 2''-*O*-acetylpolygalacin D. Especially, the anticancer activities of major and minor PS has been studied. The results showed that all PS had anti-proliferative effects on the seven types of cancer cell lines tested. In particular, *O*-acetylation at C-2 or C-3 position of rhamnose and dehydroxylation at C-24 increase the compound's cytotoxicity, while the loss of sugar residues linked to C-3 or C-28 dramatically reduced cytotoxicity. This cytotoxicity was associated with apoptosis, which was indicated by DNA fragmentation, phosphatidylserine externalization, and the activation of caspases in AGS cells. Furthermore, PS suppressed the phosphorylation of Akt, which resulted in the inhibition of mTOR and NF- κ B signaling following the inhibition of their downstream proteins. Six PS have anti-proliferative activity, and the presence of sugar residues, *O*-acetyl group of rhamnose, and a methyl group at C-4 contributes to their cytotoxicity and apoptotic activity. We also investigated the anticancer effect of platycodin D (PD), a major chemical marker and its underlying mechanism on AGS human gastric cancer cells. PD significantly inhibited cell proliferation and induced anoikis, which is a form of apoptosis in which cells detach from the substrate. It showed phosphatidylserine externalization, DNA fragmentation, increase of sub-G1 phase, and activation of caspases in a dose- and time-dependent manner. This apoptosis has been associated with the extrinsic pathway via Fas-L and the intrinsic pathway via mitochondrial Bcl-2 family members. Moreover, PD led to the phosphorylation of stress-activated protein kinases such as JNK and p38, followed by the activation of AP-1. However, pretreatment with SB203580 (p38 specific inhibitor) suppressed PD-induced p38 and AP-1 activation, and subsequently attenuated the PD-induced apoptosis in AGS cells. These results suggest that p38-mediated AP-1 activation is responsible for PD-induced apoptosis in AGS cells and PD and its derivatives might be useful for the development as the anticancer agents of gastric cancer.

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PL-10

DOES THE EXTRACTION AND ANALYTICAL TOOL AFFECT ON THE ISOLATION AND IDENTIFICATION OF SECONDARY METABOLITES FROM VARIOUS CULTIVARS OF *NIGELLA SATIVA*? POTENTIAL EFFECT ON CYP1A ACTIVITY

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Nigella sativa L., commonly known as black seed, is a member of the Ranunculaceae family. This seed is used as a natural remedy in many Middle Eastern and Far Eastern countries. Extracts prepared from *N. sativa* have, for centuries, been used for medical purposes. Thus far, the organic compounds in *N. sativa*, including alkaloids, steroids, carbohydrates, flavonoids, fatty acids, etc. have been fairly well characterized. Herein, we summarize some new extraction techniques, including microwave assisted extraction (MAE) and supercritical extraction techniques (SFE), in addition to the classical method of hydrodistillation (HD), which have been employed for isolation and various analytical techniques used for the identification of secondary metabolites in black seed. We could conclude that: a) The compositional differences observed among the cultivars are not surprising, considering the differences in genetics, growth environments and phenology; b) Various techniques used in this study also differed with respect to the yield of each extraction; and c) Various extracts (including pure compounds, essential oil, non-polar partition, relatively high-polar/non-polar partition, and polar partition) effectively inhibited CYP1A activity both in dog and rat. This *in vitro* data should be heeded as a signal of possible *in vivo* interactions. We believe that some compounds contained in *N. sativa* remain to be identified, and that high-throughput screening (such as High-resolution GC-MS and HPLC-ESI-MS/MS by means of LTQ-Orbitrap technology) could help to identify new compounds.

PL-11

AN APPROACH TO HOMEOSTASIS AND MEDICINAL PLANTS USE CASE STUDIES: GLUKEMIA AND ALZHEIMER

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The Central Nervous System (CNS), centered in the Brain, is a self regulated system, for which the bio term homeostasis may be applied, to explain its governance to oppose changes, keeping itself under a steady state of equilibrium. The brain, hence, is comparable with a system conformed by “income” and “outcome”, forms of energy, regulated by controls, or “sensors” which monitor the balance of energy, supplied for the blood stream, regulated by liver, pancreas, insulin and glucagon. These capacities of the Central Nervous System (CNS) develop since the phoetal state by his own, under the control of genetic inheritance, environment and fueling, for self preservation and auto regulation. The mechanisms of control are governed by biochemical and electrical processes that constitute the feedback, that is, the quantity of energy that outcomes the system, in counterpart of the energy income. When this retake is positive, the state of energy increases, hence a negative income merges, acting as a regulatory factor that keeps the system steady. This is Homeostasis. The interaction between the cycles of energy supply in the central nervous system, like in large systems, possesses an autocorrecting homeostasis that does not require any external control or breakeven point. In the context of this paper we approach the role of homeostasis in the brain government, and how to fuel the brain with Phytopharmacs as to keep it working in the “plateau” (homeostasis) of good standing and functioning.

INVITED LECTURES

IL-1 HISTORICAL DEVELOPMENT AND THE PRESENT STATUS OF ETHNOBOTANY IN PAKISTAN

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The history of Ethnobotany in Pakistan can be traced back to the ancient Sanskrit book *Vrikshayurveda* was compiled for teaching Botany, with special reference to plants uses. The term Ethnobotany and the first ever documentation of ethnobotanical recipes from this part of the world were reported by Sir H. W. Bellew in 1860s, since then the discipline remained long neglected. As a teaching and research discipline it was revolutionized with the concerted efforts of People and Plants-Pakistan initiatives; wherein Ethnobotany was successfully introduced in the leading universities of the country. Curriculum was developed and approved; resource centers were established and scholarships were awarded to MS and PhD scholars. All these efforts were very successful in introducing Ethnobotany as a new and established it as the most cited subject in the scientific literature appearing on plant science from Pakistan. This paper is an effort to review historical developments and present status of Ethnobotany in Pakistan. The information provided here narrates the success story of People and Plants-Pakistan on one hand and on the other hand a practical model of plant conservation is presented for replication elsewhere.

IL-2 HOLISTIC TCM CANCER THERAPY CoD™ CR ORTOMOLECULAR CANCER THERAPY SYSTEM®

Thomas v. Dávid, Agnes Toreki

Informations & Preventions Research Center Prominent
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Cancer is a multifactorial disease. To cure cancer, make the patient symptom free for many years, ensure long-term survival with "Quality of Life", we need immediately full fire, annulated the causes, to stop the uncontrolled multiplication of the cancer cells immediately and at the same time start to improve the

cellular power, repair the cellular power-factory, restore life-energy, strengthen the immune system, our self-healing power and start the destruction of the metastases and all circulating cancer cells in the body. After 30 years intensive research in South America, China, Thailand, Vietnam, Tibet and Japan on behalf of the Austrian Ministry of Science & Research we developed a biological, integrative, orthomolecular, side effects-free (Primum nil nocere!) phytotherapeutical system used very successful since 18 years worldwide in case of advanced metastatic, Stage IV., terminal cancer patients and in other chronic degenerative diseases. The goals and objectives of this study, attendees will understand the main factors of our system of 30 years preclinical investigation (research based) and 18 years evidence-based clinical documentation of the long time symptom free healing of our terminal cancer patients. Moreover, attendees will understand the main factors of our system of detoxification, alkalization, and immune-strengthening, to stop immediately the cancerous process and destroy all cancer cells (apoptosis) with the force of the nature in the body of advanced metastatic, terminal, Stage IV. cancer patients. In addition, attendees will understand the importance of mitochondrial damage repair, cellular power regeneration, ensuring cellular and life energy and self-healing power without adverse effects in cancer patients. Attendees will learn the basics, the possibilities and methods to use our system in home-care for long time success.

IL-3 COMPOUNDS OF NATURAL, PLANT OR ALGAL ORIGIN PREVENT THE TUMOR GROWTH

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Epidemiological studies have consistently shown an inverse association between consumption of vegetables and fruits and the risk of human cancers at many sites. Plant foods contain a wide variety of anticancer phytochemicals with many potential bioactivities that may reduce cancer susceptibility. Chemoprevention is a newer potentially important means to reduce the large number of cancer-related deaths by the use of specific pharmacologic or natural agents. Chemopreventive agents could target several pathways which crosstalk in a complex cellular signal transduction network that are

responsible for the development and progression of cancer. We have assessed the effects of different compounds like nicotinamide, butyric acid, calcium glucarate, inositol hexaphosphate and c-phycoyanin on tumor development in animal models and the basis for their antitumor effects at the molecular level. Use of certain compounds in-combination exhibited significant synergistic effect in preventing the skin tumor development. The tumor suppressing effects of compounds could possibly be due to the modulation of the critical events of proliferation, differentiation or cell death. Gene expression analysis suggested the involvement of apoptotic, cell cycle regulating and tumor suppressing genes in preventing the tumor development. We provide with a therapeutic rationale for agents activating non-cross-resistant pathways and targeting multiple pathways. This strategy could be equally effective in the management of any tumors. This provides a rationale for chemoprevention with agents of different nature.

IL-4

RED AND HEALTHY-ON PHYTOCHEMISTRY AND BIOACTIVITY OF TANSHINONES

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Several species of *Salvia* are distinguished by having roots colored with various shades of red or orange. This coloration is due to the content of tanshinones, rarely encountered outside this genus. Tanshinones are lipophilic, nor-abietanoid diterpenes, typically with an orthoquinoid structure. Tanshinones, along with caffeic acid oligomers are determinants of therapeutic value of *Salviae miltiorrhizae radix*, the Traditional Chinese Medicinal herb, recently (in 2013, 7th edition) included in European Pharmacopoeia. Main tanshinones in this herb

are tanshinone IIA, cryptotanshinone, and tanshinone I. Beside these three major constituents, more than 40 tanshinones or tanshinone-like structures have been described in phytochemical literature. Among the most promising properties is the cytotoxic effect on several malignant protozoan parasites, such as Plasmodium, Leishmania, and Trypanosoma. Therefore, some of the most effective tanshinones can be considered as potential lead structures for further drug development. In our paper, we will introduce some other species containing tanshinones. *Meriandra benghalensis*, a traditional medicinal plant of several countries surrounding Indian Ocean, including Erythraea, Yemen, Pakistan, e.t.c, is used against leishmaniasis, malaria and other diseases. In this respect, this plant resembles Iranian *Perovskia abrotanoides*, (Brazambol), containing significant amount of leishmanicidal tanshinones, that supports the traditional usage of this ethnic herbal remedy. Both aforementioned species is abundant in tanshinones in proportions different to *Salvia miltiorrhiza*. *Zhumeria majdae*, an Iranian endemic, is another example of tanshinone plant, used medicinally by local populations. Biogenesis of tanshinones is currently investigated by several groups, but the final steps, leading to their unique structure remain unknown. Their physiological role in plants is also not recognized. In our opinion, the tissue distribution of these compounds in cortical layers of roots suggests their defensive role against soil-borne infections, the hypothesis being supported by their significant antimicrobial properties. In conclusion, there is a substantial body of evidence supporting medicinal value of tanshinone-rich *Salvia miltiorrhiza* roots as well as individual, major compounds like tanshinone IIA and cryptotanshinone. Listing in PhEur would likely increase demand on this herb and isolated tanshinones also outside Asia. However, to meet this demand, we must extend our understanding of the biosynthetic pathways, their levels and mechanisms of regulation, and continue the pharmacological and clinical research on these compounds to fulfil requirements of evidence-based medicine (The authors acknowledge support from National Research Center (NCN) grant No. N N405 426539).

ORAL PRESENTATIONS

OP-1 HISTORY OF OPIUM IN OTTOMAN EMPIRE

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Opium poppy (*Papaver somniferum*) has been cultivated in Anatolia since 2000 BCE. The clay tablets discovered in Hattusha, the capital of the Hittite Empire, give rather detailed information on the opium poppy and the opium production. In the itineraries, European travelers such as P. Belon (1517-1564), J.P. de Tournefort (1656-1708) and G.A. Olivier (1756-1814) relate the production of opium, and its use in the Ottoman Empire. The Turkish opium containing high quantity morphine, was regarded in Europe as the best quality of opium. Ottoman drugs were displayed in European exhibitions by the Ottoman pharmacists Francesco DellaSudda (1814-1866) and Giorgio DellaSudda (Fayk Bey, 1835-1913), where they were rewarded. G. DellaSudda took a collection of opium specimens to the 1867 Paris Exhibition, and also published a booklet on the opium production and trade in the Ottoman Empire on the occasion: *Monographiedes Opiums de l' Empire Ottoman Envoyés à l' Exposition Universelle de Paris*.

OP-2 ETHNOBOTANICAL PLANT DIVERSITY WITH SPECIAL REFERENCE TO THE SOCIO-ECONOMIC IMPACT ON THE LIVES OF INDIGENOUS PEOPLE IN CHOLISTAN DESERT, PAKISTAN

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The Ethnobotanical plant diversity is very rich in Cholistan desert that is stretched along the southern border of Punjab province and it is the part of the world's seventh largest desert, the Great Desert. The plants have a strong socio-economic impact on the lives of the local people. During studies total 23 important plants belonging

to 17 families were reported. The most of the people were using the plants as ethnomedicine besides other usage including the food, fuel wood, fodder, cultural and religious purposes. During the research questionnaires were developed for the interviews conducted and information related to plant use and cultural practices were recorded. In the second phase of the research the biological activities of the plant extracts would be performed for the authentication. There is a great floral diversity in the study area. The important plants commonly used included *Neuroda procumbens*, *Calligonum polygonoides*, *Capparis decidua*, *Prosopis juliflora* and *Acacia nilotica*. The results showed that the highest number of ethnobotanical plants belonged to family Solanaceae followed by Asclepiadaceae, Papilionaceae, Amaranthaceae, and Mimosaceae. The ethnomedicinal plants were mainly utilized for the treatment of stomach disorders i.e. up to 35 % besides other ailments. *Neuroda procumbens* is a most widely used plants being used as aphrodisiac by the locals. People usually sell the plants products in the form of medicine and handicrafts prepared from plant in the market and earn money in return. The plants are not only a source of food, medicine, fodder and fuel wood but also a major source of earning for their livelihood.

OP-3 KNOWLEDGE AND ATTITUDE OF FOLK HEALERS IN NORTH-CENTRAL WESTERN GHATS OF INDIA

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Non codified folklore medicine takes care of about 70% primary healthcare needs in India. This system of medicine varies from one region to the other, which is highly influenced by local flora and fauna. The present study area, North-Central Western Ghats, is rich in diverse non-codified healing traditions, as the area is one of the global biodiversity hot spots. In the present study, 140 folk healers were personally interviewed in an open ended discussion. Their knowledge about disease diagnosis and treatment, sources of crude drugs and their usage, willingness to share the knowledge and remuneration etc. were discussed. The study revealed that folk healers treat many diseases ranging from common

cold and cough to chronic disorders like diabetes, cancer and AIDS. Majority of the folk healers (~73%) learnt the practice from forefathers and inherited through oral communication without any written documentation. Folk healers identify the diseases based on symptoms (75.71%) and pulse method (20%). Healers use both plant and animal sources for treatment. It is found that 90% of the plant drugs are collected from wild. Most of the practitioners (30%) practice as a social service. Of the remaining, 59% healers accept remuneration in the form of money, which is the actual cost of drug. Majority of the practitioners (57%) are ready to share the knowledge as inheritance is the major problem to take the knowledge further. Thus the present study helps in assessment and conservation of the precious folk knowledge of healthcare practices.

OP-4 IN-VITRO ANTIOXIDANT AND ALPHA-AMYLASE AND ALFA-GALACTOSIDASE INHIBITORY ACTIVITIES OF METHANOLIC LEAF EXTRACTS OF *FICUS DELTOIDEA* JACK VARIETIES

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Ficus deltoidea Jack (Moraceae) is a medicinal plant that widely used in several Southeast Asia countries most commonly in Malaysia and Indonesia. There are seven varieties of *F. deltoidea* Jack in Peninsular Malaysia namely; var. *deltoidea*, var. *bilobata* Corner, var. *angustifolia* (Miq.) Corner, var. *intermedia* Corner, var. *kunstleri* (King) Corner, var. *motleyana* (Miq.) Corner and var. *trengganuensis* Corner. Methanolic leaf extracts of seven varieties of *Ficus deltoidea* Jack; namely var. *deltoidea*, var. *angustifolia*, var. *intermedia*, var. *bilobata*, var. *trengganuensis*, var. *kunstleri* and var. *motleyana* that were collected from various locations in the the Malay Peninsula and Sarawak, Borneo were screened for in-vitro antioxidant and antidiabetic activities. Antioxidant activity of the extracts was determined by measuring scavenging activities of DPPH. Extract from var. *intermedia* showed the strongest antioxidant activity which enable to inhibit the 50% scavenging activity of DPPH at 50 µg/ml, followed by var. *kunstleri* and var. *bilobata* with IC₅₀ value of 90 and 98 µg/mL, respectively. Whereas the IC₅₀ for ascorbic acid was 65 µg/ml. Moderate antioxidant activity was observed for var. *trengganuensis* and var. *deltoidea*. Weak antioxidant activity was observed for var. *angustifolia* and var.

motleyana. Alpha-amylase and beta-galactosidase inhibition activities of the extracts were compared with arcabose, a positive antidiabetic drug. All seven varieties inhibited alpha-amylase better than arcabose. Extracts from var. *motleyana* and var. *intermedia* gave the strongest inhibition with percentage inhibition. For beta-galactosidase, inhibition all seven varieties gave very strong inhibition as compared with arcabose.

OP-5 WOMEN'S INDIGENOUS KNOWLEDGE OF FOLK MEDICINES

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This study analysed women's indigenous knowledge of folk medicines in selected areas in three districts viz: Swat, Buner and Chitral of Malakand Region of Pakistan. Interviews were conducted using Questionnaires and Medicinal Herb Data Sheets, and Transect Walks were executed in each area visited. The women's general medicinal herb use, preparations, storage, marketing and collection habits were ascertained from the questionnaires, whereas the Medicinal Herb Data Sheets (using both male and female respondents) provided comprehensive information on individual herbs employed in health care. The Transect Walks allowed the identified herbs of each area to be seen in their natural habitat, and provided a platform for the exploration of local herbs not known to be medicinally active by the community. A total of 87 women interviewed during the course of this study supplied information on 143 different herb species. The results of the survey showed that the knowledge of the women in all 3 districts was appreciable, but it was observed that the elder women generally, and the women from Buner District had a superior understanding of folk medicine. The Transect Walks revealed that on average the women only knew of 29% of the medicinally active herbs in their locality, whilst the men were familiar with 51%. It can be stated that the use of herbs for medicinal purposes was prevalent throughout the regions visited, and this form of medication was administered to both adults and children. The advice of doctors was also sought by most women, the main reasons being for accidents, surgery and births. Preparations of medicinal herbs rarely went beyond drying (mostly sun-drying), some women dispensed the herbs in the forms of infusions, decoctions, syrups etc. However, the typical method employed was swallowing the dried powdered herb with water. The place and type of storage of medicinal plants varied immensely, and often poor techniques such as non-airtight

containers and storing in partial sunlight were observed. Cultivation and marketing was not a priority for the women throughout the survey, and this enterprise only occurred in Buner and Chitral Districts.

The survey revealed that a number of medicinal species were being exploited by the community as a whole for marketing and personal use, and therefore, certain species were reported as being rare, vulnerable or even endangered. The primary recommendation concluded from this survey was the need for education of the women. This would embrace the techniques regarding medicinal herb use, including collection, preparation, storage and cultivation advice, and also to increase the awareness for the potential of marketing medicinal herbs. The issues relating to plant adulteration and the testing of medicinal herbs species were mentioned to ensure good quality marketable herbs. Education and awareness was considered to be essential for improved health care and successful marketing.

OP-6 AYURVEDIC MEDICINAL PLANTS GROWING IN TURKEY

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Ayurvedic medicine, as practiced in India, is one of the oldest systems of medicine in the world. Many Ayurvedic practices predate written records and were handed down by word of mouth. Two ancient books, written in Sanskrit more than 2000 years ago, are considered the main texts on Ayurvedic Medicine—*Caraka Samhita* and *Sushruta Samhita*. Ayurvedic treatments rely heavily on herbs and other plants—including oils and common spices. Currently, more than 600 herbal formulas and 250 single plant drugs are included in the “pharmacy” of Ayurvedic treatments. In ancient time Indian people were using Ayurvedic medicinal plants as a folk medicine for different diseases.

In this study, Ayurvedic medicinal plants which are growing in Turkey will be listed. The uses of the medicinal plants in Ayurveda and in Ethnobotanical studies of Turkey will be compared. This study can be helpful for the Ayurvedic practitioners who are living in Turkey and it can be helpful to produce Ayurvedic medicine with Turkish plants.

OP-7 INHIBITION OF ANGIOTENSIN CONVERTING ENZYME (ACE) ACTIVITY BY SELECTED MEDICINAL PLANT

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Angiotensin converting enzyme (ACE) is associated with endothelial dysfunction in hypertension and the development of atherosclerosis. Blockade of ACE activity can prevent the progression of atherosclerosis and reduce the cardiovascular event. In this study, the effects of several common medicinal plants were evaluated on blocking ACE activity. ACE activity was measured by spectrophotometric method and *N*-hippuryl-L-histidyl-L-leucine (HHL) was used as substrate in this assay. *Peperomia pellucida* L. showed strong inhibitory activity with IC₅₀ value of 7.16 µg/mL, followed by *Nasturtium officinale* and *Sesamum indicum* L. with IC₅₀ values of 15.4, and 30.4 µg/mL, respectively. This study shows that these plants may develop as antihypertensive agent.

OP-8 GENOTOXIC AND CYTOTOXIC EFFECTS OF PRUNUS ARMENIACA SEED EXTRACT IN VITRO

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Bitter *Prunus armeniaca* seed is used extensively by nations as a hope to cure lots of diseases including cancer, inflammatory diseases, and skin renewal. However using bitter *P. armeniaca* seed as a remedy is controversial. Little scientific experiment is conducted to understand the effects of bitter *P. armeniaca* *in vitro* and *in vivo*. The studies concerning bitter apricot seed is mostly case studies (Wallace et al. 1998, Akyildiz 2010). It is believed that amygdalin hydrolysis reaction β-glucosidase enzyme to produce cyanide is responsible for this toxicity (Ames et al. 1981, Newton, Schmidt et al. 1981). The aim of this study is to find out the cytotoxic, genotoxic and apoptotic effects of bitter *P. armeniaca* seed extracts (PE) on cultured human lymphocytes *in vitro*. Cytotoxic, genotoxic and apoptotic effects were evaluated using lactate dehydrogenase (LDH) assay, cell proliferation (WST-1) assay, sister chromatid exchange (SCE) and chromosomal aberration assay and TUNEL assay respectively. Although LDH results showed the PE groups was not cytotoxic, WST-1 assay showed low cell

viability in low concentrations of PE treated group. According to SCE results there was a significant increase between control and PE treated group. In CA assay, ring and fragmented chromosome number in low PE-treated group was higher than other PE-treated and control groups. Especially in the PE-1 treated group CA was 4.58% while in control group was 0.67%. When the PE concentrations increased the percentage of CA decreased gradually. In addition that highest apoptotic index (78%) was observed from the lowest PE treated group. In conclusion, the lower concentrations of PE may cause cytotoxic, genotoxic and apoptotic effects due to its lower antioxidant components on human lymphocytes.

OP-9

ETHNOBOTANY OF *DIOSCOREA HISPIDA* DENNST. (*UBI GADONG*) IN THE STATE OF TERENGGANU, MALAYSIA

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In this study; the ethnobotanical importance of *Dioscorea hispida* Dennst. (*UbiGadong*) in the State of Terengganu, Peninsular Malaysia, Malaysia was investigated. Ethnobotany is the study of relationship between plants and people. Previous ethnobotanical survey carried out on the Malay villagers in Pulau Redang, Kuala Terengganu district of Terengganu, indicated that *Dioscorea hispida* tuber is used as food, traditional medicines to treat diabetes and shingle infestation, for de-worming as well as fish poison. On the other hand, the villagers of Sainnamari and Thanarbaid, Tangail, Bangladesh had used the poisonous tuber paste of *Dioscorea* sp. as poison in hunting. This ethnobotanical investigation has been carried out in all (seven) districts of Terengganu; which are Hulu Terengganu, Setiu, Kuala Terengganu, Marang, Kemaman and Dungun. Through semi-structured questionnaires and personal interviews, the indigenous knowledge of the Malay respondents about *Dioscorea hispida* and its uses include; for traditional medicines (de-worming, lice infestation, swelling, diabetes, fever, joint pain and sinus), cosmetics (pigmentation remedy) and other uses (botanical pesticide, meat de-worming, avoiding worms in pickle, sedative drug in hunting, fish or shrimp bait, and as a carved-mold to be pressed in silk printing process) were documented. The study also documented the potential of *Dioscorea hispida* to be

commercialized as edible food and suggestions on cultivation method of *Dioscorea hispida*. The full knowledge regarding the distribution, uses and potentials of *Dioscorea hispida* is necessary for its proper utilization and possible commercialization.

OP-10

ETHNOBOTANICAL PROPERTIES OF BLACKSEA REGION: ON EMPHASIS OF AKÇAKOCA (DÜZCE) DISTRICT

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Before settled agriculture, people collected, dried and stored fruits and seeds from edible plants to survive in the winter. The accumulated knowledge on traditional using of plants transferred along the centuries. Even, when they migrated anywhere they sustained that knowledge. In Turkey, the ethnobotanical treatments are remarkable since a wealth of cultural heritage and richness of flora. So, nowadays, the ethnobotanical studies are carried on carefully and quickly by Turkish scientists. There are many studies on ethnobotanical properties of the Blacksea Region of Turkey. In this investigation, some Turkish local plant names and their uses were collected via interviews during the floristic excursions about Akçakoca's flora from 2000 to 2003. In Akçakoca, 46 taxa have 48 Turkish local names and all of them are used for various purposes by local people. 21 of them are traditional medicine for human treatments, 19 are edible green or cooked and 4 are fuel. 19 usages are firstly recorded in this study. Additionally, a questionnaire about some demographic characteristics of participants was administered to the local people.

OP 11

MEDICINAL and REFRESHING HERBAL TEAS COMMONLY USED in TURKEY

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Herbal teas (sometimes they are known as tisanes) are commonly consumed beverages made from the different parts (leaf, flower, seed, fruit, stem, and root) of plant species. They are the infusions–or decoctions of plant

material in water. They are generally served hot and distinguished from the other widespread brewed beverages like maté, coffee and *Camellia* teas (black, green, white etc.) with their non-caffeinated contents. For thousands of years, herbal teas have been used for refreshment, disease prevention and health care in many parts of the world. In other words, one of the easiest and most popular ways of preparing a herbal medicine is to brew a tea. But the properties of attractive flavors make some herbal teas become more popular worldwide. "Return to nature" phenomena of the last three decades also caused the increase in scientific research of herbal teas. According to the results, herbal teas have many favorable effects, such as anti-aging, cardioprotective, hepatoprotective, neuroprotective, anti-inflammatory, antimicrobial, antioxidant, and can be used for boosting human health and reducing the risk of chronic diseases. In Turkey, utilization of herbal teas is also very frequent, especially in Mediterranean and Aegean regions of the country. In rural areas during the summer months, plants growing wild are harvested for drinks and a medicine, hanged up in bunches in every available place in cellar rooms. The use of herbal teas mostly enjoyed as an alternative to *Camellia* tea in these regions. This review will give an overview of the historical and modern uses, preparation, botany, distribution, pharmacology and chemical composition of herbal teas commonly used in Turkey.

OP-12
UNDERSTANDING THE ROLE OF PLANT
MEDICINES WITHIN HIMBA CONCEPTIONS OF
HEALTH AND ILLNESS

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The Ova Himba of Northwestern Namibia (Southern Africa) is a cattle-herding and traditionally living people who number about 12.000 souls. They live from the milk and meat their cattle provide and from the maize they cultivate during the rainy season. Many Himba, especially women, have a keen knowledge of medicinal plants, though as the central government provides more clinics and nursing stations with modern medicines and pain relievers, plant medicines are not quit as important as they once were. There are two categories of illness among Himba: Ordinary and Extraordinary. An ordinary illness will likely respond to plant medicines and most illnesses among Himba are thought of as ordinary. Extraordinary illness will never respond to medicinal plants-or even to the medicines from a clinic or nursing station because

their cause is rooted in *omiti*, a substance that occurs as a part of the natural world that evil men and women send into a person's body with intent to kill. When this happens, only a diviner can help.

OP-13
EVOLUTION AND CHANGES IN THE
MEDITERRANEAN LANDSCAPE, THE CASE OF
PALMS

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This research represents an in-depth study focusing on palms in the Mediterranean setting. It is intended to highlight the relationship between population and its landscape: first, by examining the ethno-botanical and symbolic value that the palm has acquired and consolidated in the course of history up to nowadays; then, by moving to a scientific and technical analysis on the current, devastating spread of the phenomenon of *Rhynchophorus ferrugineus*, made explicit through the illustration of a case study of the Botanical Garden in Naples, where it has been thwarted. The final part focuses again on the central theme of relationship between man and landscape, but at the same time opens the question of ecosystem balance requiring a reflection on the scientific approach in landscape design and in the evaluation and dissemination of prevention and care measures according to these phenomena.

OP-14
THE ETHNOBOTANICAL INVESTIGATIONS IN
BAYRAMIÇ (ÇANAKKALE-TURKEY)

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The ethnobotanical investigations were made in order to determine the plants used by the people in the locality of Bayramiç (Çanakkale), which have a traditional function in their life. For this purpose, the center of Bayramiç and all of the 76 villages have been visited between April 2004 and June 2007. During the field works, 364 plant specimens were collected and the various ethnobotanical information belonging to these plants were provided. The information was obtained through open and semi-structured interviews with the local people. According to the results of this study total 193 taxa which have ethnobotanical usage, were identified. Among them 161

taxa are wild and 32 taxa are cultivated. The plants are mostly used as folk medicine (90 taxa), food (68 taxa), animal food (27 taxa), tea (17 taxa), ornament (15 taxa), fuel (14 taxa), broom (9 taxa), spice (9 taxa), hedge (6 taxa) and dye (6 taxa).

OP-15

ADVANCES IN ETHNOBOTANICAL RESEARCH IN CENTRAL SULAWESI INDONESIA

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Indonesia is a country rich in biodiversity and also the largest archipelago country in the world. It has more than 17,000 islands either large or small that stretched from West to East with area of 7.7 million sq km territory; it is located between two important biogeographic regions that is the Indo-Malaya and Oceania. Beside rich with biodiversity, Indonesia also has a wealth of culture, where there are more than 400 indigenous ethnic groups scattered in the territory of Indonesia with a diversity of different languages and dialects which estimated the number reached 665, of which there are 250 ethnics of them in Papua, 133 in Mollucas, 105 in Sulawesi, 77 in Kalimantan, 53 in Nusa Tenggara (Lesser Sunda islands), 38 in Sumatra, 9 in Java and Bali. Central Sulawesi is one of Province in Indonesia. It is located in Sulawesi Island (formerly known as Celebes). The Sulawesi Island is important island in the "Wallacea sub region", a unique region with their biodiversity, situated in the Centre of the Indonesian archipelago, between Borneo (Kalimantan) and the Moluccas islands. The sub region of Wallacea is an area delimited by Wallace's Line in the west and Lydekker's Line in the east. The knowledge of plant biodiversity is poorly known, but it has recently been identified as one of the world's biodiversity hotspots, especially rich in species found nowhere else in the world and under major threat from widespread habitat reduction. Central Sulawesi province is inhabited by a variety of different ethnicities whether they are migrants or indigenous (19 indigenous). Like other, the indigenous people Central Sulawesi Indonesia have used native plants in their daily lives for thousands of years. For example; various species of forest

plants have since a long time had been used traditionally by them for food, vegetable, medicine, spices, ritual ceremony, construction, cosmetic, dyes and other. However, until now there has been no comprehensive data on how people's knowledge about the utilization of plants for their daily need. During last four years, the Department of Biology Faculty Mathematics and Natural Science Tadulako University has conducted several researches in different ethnic group with the topic related to the subject mentioned above such as: ethnobotanical research (Laudje tribe, Kaili Inde tribe, Kaili Ledo tribe, Kaili Tara tribe, and Tajo), ethnopharmacology (Pekerehua tribe, Behoa tribe, Kaili tribe, Kaili Tado, Kaili Rai tribe, Tialo tribe, Tolitoli ethnic and Buginese ethnic), comparative ethnobotany (Parigi Moutong community), ethnoecology (Tao Taa Wana tribe) and ritual ceremony (Tajo ethnic). The results of the research are presented in this paper

OP-16

EFFECT OF HERBIVORE DAMAGE ON FITNESS IN TWO COLUMNAR CACTI OF MEXICO WITH DIFERENT FORMS OF MANAGEMENT

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Stenocereus pruinosus and *S. stellatus* are two columnar cacti distributed in the central region of Mexico. Both species have been intensively used, for their fleshy and acid fruits, since prehispanic times. People obtain fruits from wild and cultivated populations, as well as from plants growing in areas opened for maize crop (tolerated). At the present, herbivore damage has been observed in all kinds of management, which consists on stem rotting that affects fruit production, and even plant death. Based on previous studies on domestication in cacti, our hypothesis is that cultivated populations will exhibit higher levels of damage, because of domestication effect. Total damage percentage was estimated (0 to 100%), and fitness was estimated as fruits weight and number, seed weight and biomass in 348 individuals of both species. Analysis of Variance was applied to compare differences between damage and fitness in both species and forms of management. A linear regression analysis was used to compare relationship between damage percentage and fitness, within forms of management and species. Herbivore damage exhibited significant differences between species and forms of

management. *S. stellatus* exhibited higher levels of damage, but fitness decreased in cultivated populations of *S. pruinosus*, and in tolerated populations of *S. stellatus*. It means that herbivore damage susceptibility and fitness are no correlated responses, which is favorable for farmers in terms of fruit production.

OP-17 THE FOLK MEDICINAL PLANTS OF ANTALYA (TURKEY)

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This study including our investigations and scientific literature record was made to reveal the plants used as traditional folk medicine in Antalya located in the south of Turkey. The specimens of the plants used as folk remedies have been collected and the information about the local names, the part(s) used, the ailments treated, the therapeutic effect, the preparation, the methods of administration, and the duration of treatment has been recorded. The plant specimens are kept in the Herbarium of the Faculty of Pharmacy, Marmara University. As a result of identification of the plant specimens, 148 species, used as a traditional folk medicine in Antalya, have been determined. Among them, 133 species are wild and 15 species are cultivated plants. According to the majority of the plants which have similar usage, the plants are mostly used for gastrointestinal disorders, asthma and bronchitis, rheumatism, diabetes and heart diseases.

OP-18 GLUTATHIONE S-TRANSFERASES SPECIFIC ACTIVITY, ACUTE ORAL TOXICITY AND IN VIVO HEPATOPROTECTIVE EFFECTS OF KANJI

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Kanji, a self-fermented probiotic beverage prepared from roots of *Daucus carota* L. subsp. *sativus* (Hoffm.) Arcang. var. *vavilovii* Mazk. (*Apiaceae*) is extensively consumed during early summer in many Asian countries to protect liver and improve digestion. The use of this

remedy may inhibit/induce phase-I and -II enzymes and interfere in metabolism of concomitantly used drugs. Additionally, this beverage has not been investigated for acute oral toxicity and hepatoprotective activity. Therefore, the present study describes glutathione S-transferases (GSTs) activity, acute oral toxicity and hepatoprotective activity of *Kanji*. The different concentrations of *Kanji* were incubated with rat liver cytosolic fraction and the enzyme inhibition/induction was determined at 340 nm using 1-chloro-2,4-dinitrobenzene as a substrate. Prior to *in vivo* studies, the *Kanji* was investigated for acute oral toxicity at a limit dose of 2000 mg/kg using female rats. Afterwards, the *Kanji* at a dose of 390 mg/kg/day was investigated for *in vivo* hepatoprotective activity using a mixture of isoniazid and rifampicin to induce stress. The *Kanji* showed weak GSTs inhibition, median lethal dose (LD₅₀) > 2000 mg/kg and good hepatoprotective activity. Therefore, it is concluded that *Kanji* and ethanol extracts of roots of *Daucus carota* L. do not interfere with drugs metabolized by GSTs and have good hepatoprotective effects.

OP-19 ANTI-TUMOR ACTIVITY OF SOME PLANT POLYSACCHARIDES

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Immunological active polysaccharides (PS.ApI, PS.ApII, PS.ApIII and PS.AgI) were extracted and purified from two plants used in traditional medicine in Algeria, and were investigated for their anti-tumor activity. The four components exhibited an enhancement of the cytotoxic activity of human peripheral blood adherent cells against MDA-MB 231 tumor cells. A similar pattern was observed with polysaccharide pretreatment natural killer cells cultures, but this activity was more potent in the presence of T lymphocytes. The NK cytotoxicity enhancement was blocked in the presence of anti-IL2 antibodies during pretreatment with PSApIII and PSAgI and decreased with PSApI and PSAgII.

OP-20 AN ETHNOBOTANICAL COLLECTION IN TURKEY

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Turkey is one of the richest countries in terms of plant diversity in the world. Approximately 11.500 plant species have been recorded in flora of Turkey and about 32% of these are endemic. The ethnobotanical studies show that diversity of plant usage the multicultural structure of Turkey as well as. Documentation of the traditional knowledge through ethnobotanical studies is important for the conservation and utilization of biological resources. Recently, there are many ethnobotanical researches from Turkey. The other sides of the studies are ethnobotanical collections. Unfortunately, only one work was found on this issue, Akan's basket collection. The establishment of an ethnobotanical collection in Istanbul University, Faculty of Pharmacy, and Department of Pharmaceutical Botany was started in 2007. About 90 objects were collected around Turkey. These include medicines, foods and ethnographic materials (such as musical instruments, agricultural tools and utensils) as well as plants specimens (including seeds, roots, fruits and oils). In this study, information about plants that made objects preparations and usages of objects are presented.

OP-21 ANTIANEMIA STUDY OF *MORINGA OLEIFERA* LAMK. LEAVES EXTRACT ON ANILINE- INDUCED WHITE FEMALE RATS

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Moringa (*Moringa oleifera* L.) was traditionally used for the treatment of inflammation and infectious diseases along with cardiovascular, gastrointestinal, hematological and hepatorenal disorders. The leaves has been observed about its high nutrient content including the iron content that needed for the synthesis of red blood cells (erythrocyte). The purpose of this study was to prove scientifically the effect of 70% ethanolic extract of moringa leaves to erythrocyte's morphology, hematology examination (hemoglobin, erythrocyte, hematocrit) and total Iron content in blood of rats on aniline induced white female rats. A total of 30 female white rats of *Sprague-*

Dawley rats were divided into 6 groups: normal control, anemia control, comparison control, and three groups of moringa leaves extract. All groups, except the normal control, induced by aniline at dose 0.005 mL/ g bw through intraperitoneal injection. On fifth day, normal and anemia control were given 0.5 %, CMC solution, comparison control was given ferro fumaras and three other groups were given moringa leaves extract at doses 198 mg, 396 mg, and 792 mg/200 g bw/day until the eleventh day. The results showed that as the dose of moringa leaves increasing, the level of hemoglobin, erythrocyte, hematocrit, and total iron content in blood of rats also increased. Moreover, moringa leaves extract at dose 792 mg/200 g bw/day can improve erythrocyte's morphology and increase the level of hemoglobin and erythrocyte of rats significantly ($p < 0.05$).

OP-22 INHIBITORY EFFECTS OF METHANOLIC EXTRACTS OF *SALVIA FRUTICOSA* MILL. ON PRO-INFLAMMATORY CYTOKINES PRODUCTION IN RAW 264.7 INVITRO CELLULAR MODEL AND IN BALB/C MICE INVIVO MODEL

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The aim of this study is to elucidate the anti-inflammatory effects of methanolic extract (MeOH) of *Salvia fruticosa* Mill. (*S. fruticosa*) on the production of pro-inflammatory cytokines in lipopolysaccharide (LPS)-stimulated RAW 264.7 cells and in Balb/c mice. Tumor necrosis factor- α (TNF- α), Interlukin-6 (IL-6), and Interlukin 1 β (IL-1 β) production in RAW 264.7 cells and in Balb/c mice were evaluated. The extract of *S. fruticosa* exhibited potent inhibitory effects on pro-inflammatory cytokines production in both cellular and animal models stimulated by LPS. Our data suggest that the methanolic extract of *S. fruticosa* could be developed as a potential anti-inflammatory candidate for the treatment of inflammatory diseases mediated by overproduction of pro-inflammatory cytokines such as rheumatoid arthritis.

OP-23 ANTICOCCIDIAL POTENTIAL OF *PINUS RADIATA* BARK IN BROILER CHICKENS

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The objective of this study was to evaluate the anticoccidial effect of different concentrations of 70% crude aqueous methanolic extract of *Pinus radiata* bark against mixed *Eimeria* species infection in broiler chickens. An experimental study was performed on a total of 198, day-old broiler chicks and randomly divided into six groups, each having 33 chicks. Three different concentrations 0.1%, 0.2% and 0.3% of 70% crude aqueous methanolic extract were given in feed from 10th to 18th day of age, to the birds of groups 1, 2, and 3 respectively. The chicks of all groups except group 6 were infected orally with sporulated oocytes at the dose rate of 50,000/chick at the age of 12 days. The groups 4 and 6 served as infected non-medicated and non-infected non-medicated control respectively, while the group 5 was treated with amprolium (125 ppm). Body weight gain and feed conversion ratio were investigated throughout the experimental period while the lesion score and fecal score were examined after 7 day post inoculation. The significant ($p \leq 0.05$) increase in weight gain was observed in groups treated with different concentrations of 70% crude aqueous methanolic extract of *Pinus radiata* bark as compared to infected non medicated control, almost similar trend was observed for FCR. Furthermore, *Pinus radiata* at level of 0.3% showed significantly less lesion and fecal score, and less mortality as exhibited by infected non-medicated control. Concentration-dependent anticoccidial effect of *Pinus radiata* suggests their use as a complement with anticoccidial drugs for better control of avian coccidiosis.

OP-24 ETHNOBOTANY AND CONSERVATION STATUS OF SOME TRADITIONALLY VALUED PLANTS OF KAGHAN VALLEY, MANSEHRA, KPK, PAKISTAN

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There are many sites in the Himalayan region where comprehensive floristic studies and their documentation

are required in connection with conservation status of important plant species. In Pakistan there are only few reports available which have indicated the conservation status of some plant species. Approximately 37 species have been cited as threatened from Ayubia National Park. Using IUCN criteria 1970, fifty five medicinal plant species from three districts of Malakand have been reported as threatened. Adopting IUCN criteria 1994, twenty plant species have been identified as target species from Pakistan. With this objective in mind, a study was conducted to find out the conservation status of traditionally valued medicinal plants of Kaghan Valley. It was found that 108 plants are used for various ailments. The results regarding conservation status have shown that the entire threatened flora is of ethnobotanical value and these plants are utilized for various purposes in the Valley. There are 30 threatened plant species in Kaghan Valley, (comprising herbs, shrubs and trees) of which 3 plant species are critically endangered, 14 are endangered, 10 are vulnerable and 3 are near threatened. Thus 27.77% of the total ethnobotanically valued plants of Kaghan Valley are at risk, of which 2.77% are critically endangered, 12.96% are endangered, 9.25% are vulnerable and 2.77% are near threatened.

OP-25 BIOLOGICAL ACTIVITIES OF *PHOENIX DACTYLEFERA* GROWING IN ALGERIA

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Phoenix dactylifera L. (date palm) is a desert plant with comestible fruits. According to the FAO (2007), Algeria produces more than half a million tons of dates per year. This work aimed to evaluate the phenolic contents and antioxidant and antimicrobial activities of this edible and medicinal plant. Extracts were obtained by maceration of fruits (*Deglet-Nour* variety) using several solvents with increasing polarity: chloroform, ethyl acetate and ethanol and from the syrup (*robb*) with ethanol, the yields were: 0.03, 0.14, 11.8 and 16.02% (w/w) respectively Total phenolic contents were determined using Folin-Ciocalteu reagent and found to be 0.552, 2.492, 339.84 and 381.27mg gallic acid equivalent (GAE)/100 g fresh weight (FW) in chloroform, ethyl acetate and ethanol (*robb* and dates) extracts respectively. Flavonoids were evaluated by AlCl₃ method and shown to be 0.45, 0.67, 33.39 and 41.76 mg quercetin equivalent (QE)/100 g FW in chloroform, ethyl acetate and ethanol (*robb* and dates) extracts respectively. The flavons and flavonols contents ranged between 0.157 and 24.67 mg QE/100 g FW [2]. Qualitative and quantitative antioxidant activity was

evaluated using β - carotene/ linoleic acid system (bleaching test), it ranged between 33% and 55% for all extracts and seems to be closed to that of BHA 55% when used at 2mg/ml. Free radical scavenging effects were evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH), the IC_{50} were 924 , 715.91, 64.84 , 55.6 μ g/ml for chloroform, ethyl acetate and ethanol (*robb* and dates) extracts, respectively, whereas BHT showed 37.31 μ g/ml. Antibacterial activity was determined using three bacterial strains (Gram+ and Gram-) according to the disc diffusion assay; all extracts have shown inhibitory effects against the microorganisms tested. Minimal Inhibitory Concentrations (MICs) were 100, 20 and 20 μ g/ml for *Echerichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*, respectively.

OP-26 ANTIOXIDANT ACTIVITIES AND BIOACTIVE COMPOUNDS OF FIVE JALOPENO PEPPERS (CAPSICUM ANNUUM L.) CULTIVARS

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The present study was designed to evaluate the contents of different antioxidants compounds and their antioxidant activities in five Jalopeno peppers (*Capsicum annum*) cultivars (El Dorido, Grande, Tula, Sayula and El Rey) extracts. Antioxidant activities of peppers fruit extract were assessed using 1, 1-diphenyl-2-picrylhydrazyl (DPPH) and reducing power assay. Free radical scavenging activity of Grande was recorded as high as 87 % followed by El Dorido (83%). The lowest free radical scavenging activity found in El Rey cultivar (52.1 %). Results of reducing power (Fe^{3+} to Fe^{2+}) showed that Grande (0.85 %) and El Dorido (0.81 %) fruit extract absorbance value were close to synthetic antioxidant BHT (0.97 %) obtained at 100 μ g/mL. The results showed that total phenolic content of El Dorido (38.4 ± 0.12 mg GA/100 g DW) and Grande (3.38 ± 0.03 mg/g GAE) were significantly higher compared to other Jalapeno pepper cultivars fruits. Results indicated strong and positive correlation between antioxidant activity (DPPH scavenging activity) and carotenoids content ($r=0.75$), vitamin C ($r=0.78$) and total capsaicinoids ($r=0.84$) respectively. The results of the antioxidant activity assays showed that the El Dorido and Grande had strongest antioxidant activity compared to other peppers cultivars in this study. Hot peppers cultivars are rich in capsaicinoids, vitamin C and carotenoids with pharmacological

properties giving the specific taste to pepper fruit. Lipid peroxidation inhibition ability, reducing power and antioxidant activities of nine peppers correlated well with their total phenolic, vitamin C and carotenoids contents.

OP-27 CHARACTERISATION OF BIOLOGICALLY ACTIVE CONSTITUENTS OF SUAEDA FRUTICOSA

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The present findings relates to the isolation and characterization of palmitic acid ($C_{16}H_{32}O_2$) and benzoic acid ($C_7H_6O_2$) as active ingredients of a shrubby halophyte *Suaeda fruticosa* (commonly called Alkali blite) against human lung carcinoma (LU-1) and hormone dependent prostrate carcinoma (LnCaP) cell lines. The palmitic acid and benzoic acid were isolated via MPLC (Silica gel pore size; 200-425) 10g, (column size 2.1 x 32 cm), and eluted with $CHCl_3/MeOH$ gradient at 2.5 ml/min flow rate and positively identified by 1H and ^{13}C NMR, HMBC and HSQC. The isolated metabolites at five concentrations of 20 μ g/mL, 10 μ g/mL, 5.0 μ g/mL, 2.5 μ g/mL and 1.25 μ g/mL have been evaluated in cancer bio-assays against human lung carcinoma (LU-1), hormone dependent prostrate carcinoma (LnCaP) by the method of sulforhodamine B (SRB) dye. The Palmitic acid demonstrated anticancer activity with IC_{50} value of 19.0 μ g/ml against human lung carcinoma (LU-1), and $\leq 20\mu$ g/ml against hormone dependent prostrate carcinoma (LnCaP). Benzoic acid ($C_7H_6O_2$) exhibited $IC_{50} \leq 20\mu$ g/ml against hormone dependent prostrate carcinoma (LnCaP) and $IC_{50} \geq 20\mu$ g/ml against human lung carcinoma (LU-1). It is inferred from the results that these compounds can be implicated to remedy for the cancer.

OP-28 ETHNIC MEDICINE AND TRADITIONAL MEDICATIONS OF ETHIOPIAN AND YEMENITE COMMUNITIES IN ISRAEL

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Many diverse communities have come together in the land of Israel, each with its own distinctive culture and lifestyle. They bring with them their traditional medicine, as well as their traditional medications and medicinal plants. Two such important communities are the

Ethiopian and the Yemenite immigrants. The community of Yemenite Jews immigrated to Israel much earlier as compared to the Ethiopian community, which at present numbers about 120,000 people. Both groups maintain traditional practices, even though the effect of time and assimilation is more visible in the more established Yemenite community and especially among the native-Israeli born young people. There are many great similarities in Ethnic Medicine and traditions among Ethiopians and Yemenites. The purpose of this paper is to highlight the similarities and emphasize the unique traditions of these two groups before they disappear into the strong melting pot-the new, modern Israeli society.

Important points:

1. Geographical neighborhood, leading to cultural and traditional ties.
 2. Geological and climatic similarities-and as a result both countries have very rich and unique flora. Same plants are used in both countries-such as *Commiphora* (Myrrha) and *Boswellia* (Frankincense).
 3. Traditional methods of healing were transferred orally from father to son in both countries and as a result of very few written sources; interviewing healers in both communities became crucial for preservation of knowledge.
 4. Similar major medicinal plants are used for healing. Examples are: Leaves of Khat (*Catha edulis*) for chewing, Coffee beans (Coffee ceremony), *Rutachalepensis*, *Withania somnifera*, *Trigonella foenum-graecum* and *Nigella sativa*.
 5. Healing traditions include ceremonies and supernatural practices.
 6. There are philological similarities in names of some of the medicaments: (Coffee drink is Buna among the Ethiopians and Byn or Boon among the Yemenites)
 7. Finally-Similar elements of diet can be observed, such as low milk products, high sieve content, etc.
- The effect of assimilation process in the "new" country will be evaluated.

OP-29
STRATEGY FOR CONSERVATION,
RESTORATION, AND UTILIZATION OF RARE
AND ENDANGERED PLANTS-A CASE OF
COOPERATIVE PROJECT FOR WILD KOREAN
GINSENG (*PANAX GINSENG* C. A. MEYER)

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Panax ginseng C. A. Meyer is distributed from Korean Peninsula through Northeast China to Russia Far East. Ginsenosides of ginseng are observed to help pharmacological actions including immune system modulation, anti-stress activities, anticancer effects, etc. Wild ginseng has long been accepted as high medicinal values, very rarely found in nature due to reckless harvest, and thought to be close to extinction, in Korea. Many rare and endangered species are faced with extinction like Korean wild ginseng on account of over-exploration and climate change. Thus, it is very urgent to develop guidelines and establish strategies for conservation, restoration, and utilization of such plants like Korean wild ginseng. Forest Ginseng R&D Center (FGRDC) of Kangwon National University introduced strategies and methods for such activities for wild ginseng. Each municipal government is responsible for wild ginseng collection and conservation of orchard establishment and FGRDC establish the conservation orchard and perform research activates, propagate and develop the utilization method of wild ginseng for medicine, food and etc. Financial support and provision of genetic resources from those governments are critical for FGRDC. The progeny of wild ginsengs are given to FGRDC as propagation materials, the final products from FGRDC will be provided to government for restoration of natural habitat and commercial use. Korea Forest Service (KFS) was proposed to support financially FGRDC and obtain a lot of information for regulations and policies, and to control the unrevealed trade of wild ginsengs and to rehabilitate those. Techniques of FGRDC include propagation methods focused on artificial pollination and tissue culture, morphological and molecular genetic diversity analysis, cryopreservation of germ plasm, and chemical component analysis. Active cooperation of food or medicine companies is encouraged for successful works of FGRDC. A collaborative network is also necessary among East Asian countries which own wild rare and endangered plant genetic resources, i.e., *Panax ginseng*, etc. **Financial supports were given to the senior author for this study by the Municipal Government of Inje-gun, Gangwon-do, Republic of Korea and the Ministry of Education, China (Project No. MS2012DBLY017).

OP-30
CHEMICAL COMPOSITION AND
ANTIMICROBIAL ACTIVITY OF THE
ESSENTIAL OIL FROM MAQIAN
(*ZANTHOXYLUM MYRIACANTHUM* VAR.
***PUBESCENS* (HUANG) HUANG) IN**
XISHUANGBANNA

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Maqian, which is the ripe fruit of *Zanthoxylum myriacanthum* var. *pubescens* (Huang) Huang), is one of the most appreciated traditional spices for roasting meat, salting pork, boiling fish and cooking vegetable soup in the ethnic villages of Xishuangbanna. What is more,

Maqian is also used as a traditional remedy for digestive disorder, activation of qi, detoxification, and relief of swelling and pain by Dai people in Xishuangbanna. In this work, the essential oil of Maqian (EOM) was extracted from the ripe fruit by steam distillation and identified by gas chromatography (GC) and mass spectrometry (MS) analysis. The antimicrobial susceptibilities were screened for inhibitory zone and MICs/MBCs determined by serial dilution with a standardized microdilution broth methodology against four Gram-positive, three Gram-negative bacteria and two fungi. Tigecycline, fluconazole, vancomycin and amikacin were used as a positive control agent. Analyzed by GC-MS, the main constituents of the oil were limonene (67.1%), and sabinene (6.5%). The results showed that EOM exhibited remarkable antimicrobial activity, with MIC ranging between 64 and 1024 µg/ml and MBC ranging from 64 to more than 1024 µg/ml, which indicated that Maqian could be better choice than other Chinese prickly ash to be applied as a natural antimicrobial spice in food industries.

POSTER PRESENTATIONS

PP-1 BIOLOGICAL ACTIVITY AND THERAPEUTIC EFFECT OF VINCAMINE

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Vinca minor L. (Apocynaceae) which is widely distributed through Europe has a good reputation in folk traditions and medicines. This medicinal plant has long been used for the treatment of various diseases. In the view of the therapeutic importance of vincamine, the major alkaloidal constituents of *Vinca minor* and the fact that this alkaloid has been successfully obtained from vincadifformine recently, we have taken the opportunity to convert the novel alkaloid into the analogous vincamine. The structure and absolute configuration of the alkaloids were determined by spectroscopic methods.

PP-2 FATTY ACID AND ESSENTIAL OIL COMPOSITIONS OF DNA DAMAGE OF *MELISSA OFFICINALIS* L. SUBSP. *ALTISSIMA* (SM.) ARCANGELI

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Melissa officinalis L. subsp. *altissima* (Sm.) Arcangeli include in Lamiaceae family and distributed in South Europe, Balkans, Aegean, North Africa and Caucassia. The plant is named Kovanotu and Limon nanesi and used for treatment of headaches, influenza, toothaches and as antispasmodic, kardiotoxic, carminative, diaphoretic, antiseptic, antidepressant, antiviral, antibacterial, sedative, stomachic, headaches and nervousness in Turkey.A

literature survey showed that there have been numerous of phytochemical and biological activity reports on *M.officinalis*. However, there have been no previous phytochemical and biological activity reports on *M. officinalis* subsp. *altissima*. *M. officinalis* subsp. *Altissima* has been grown widely in Turkey such as Antalya, Bartın, Sivas, Tekirdağ, Muğla. The purpose of this investigation was to prove the fatty acid composition and the essential oil composition of the DNA damage methanolextractof *Melissa officinalis* subsp. *Altissima*. The effect of the methanol extract of *M.officinalis*subsp. *altissima* on plasmid DNA cleavage by OH radicals was investigated. This study was the first fatty acid, essential oil analysis and DNA damage report on an edible plant; *M. officinalis* subsp. *altissima*. The major components of the essential oil were identified valencene (23.2%), α -selinene (8.9%) and caryophyllene oxide (7.8%). The main constituents of the fatty acid obtained from the petroleum ether extract were identified as linolenic acid (27.4%), palmitic acid (26.4%) and linoleic acid (18.4%). The results showed that the methanol extract of *M.officinalis* subsp. *altissima* had potent activity to protect DNA from oxidation.

PP-3 INVESTIGATIONS ON ENDEMIC *VERONICA THYMOIDES* SUBSP. *PSEUDOCINEREA*

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In Turkey, the genus *Veronica* L. (Scrophulariaceae) is represented by 79 species, 26 of them are endemic. *Veronica* species known in Turkish as “At teresi, Çıban otu” have been used as diuretic and for wound healing in Turkish folk medicine. They have also been used as

restoratives, tonics and in the treatment of respiratory diseases in Chinese and Native American traditional medicines. *Veronica thymoides* subsp. P.H. Davis *pseudocinerea* M.A. Fischer which is an endemic *Veronica* species has been grown in Kahramanmaraş, Kastamonu, Ankara (Turkey). A literature survey showed that there are no phytochemical or biological activity reports on *V. thymoides* subsp. *pseudocinerea*. The purpose of the current study was to examine the fatty acid and essential oil compositions of *V. thymoides* subsp. *pseudocinerea*, the antimicrobial and DNA damage effects of the extracts. The fatty acid composition of the petroleum ether extract and the essential oil composition were determined by GC/MS analysis. The disc diffusion method was used to determine the antimicrobial activity. The present study was the first fatty acid and essential oil analysis, and biological activity report on an endemic *Veronica* species, *Veronica thymoides* subsp. *pseudocinerea*. Hexatriacontene (21.0%) was found to be the main constituent in the essential oil. The major component in the fatty acid obtained from the petroleum ether extract was identified as linoleic acid (25.2%). The acetone and methanol extracts possessed strong inhibition against *P. aeruginosa* at 30 mg/mL. The inhibition of the methanol extract on plasmid DNA cleavage by OH radicals was found to be 93.32% at 500 µg/mL.

PP-4 PHYTOCHEMICAL INVESTIGATION OF TWO *ALCEA* L. SPECIES FROM ANATOLIA WITH ANTIMICROBIAL ACTIVITY

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Alcea L. is represented by 20 species in Turkey, by about 70 species worldwide and distributed in Mediterranean and Iran-Turanian phytogeographical region. In Anatolia, *Alcea* species are named as Hatmi, in general, and *Alcea setosa* (Boiss.) Alefas Hatme Çiçeği while *Alcea hohenackeri* (Boiss. & Huet) Boiss. as Gülhatmi, Heru. There are a number of folkloric uses of these species including wound healing, gastro-intestinal, diuretic and

antitussive agents as well as in the treatment of cold, influenza and hemorrhoids. They are also used as foods, cosmetics and ornamental plants in Turkey. A literature survey showed that there are no phytochemical or antimicrobial activity reports on *A. setosa* and *A. hohenackeri*. Hence, we determined the fatty acid compositions of *A. setosa* and *A. hohenackeri* petroleum ether extracts using GC/MS analyses, and examined associated antimicrobial activity. The essential oils of *A. setosa* and *A. hohenackeri* were analyzed to determine its composition by GC/MS. The major component of the essential oil of the two species was identified as arachidic acid (27.4%) for *A. setosa* and tetratetracontane (15.5%) for *A. hohenackeri*. The main constituent of the fatty acids obtained from the petroleum ether extracts of *A. setosa* and *A. hohenackeri* was identified as palmitic acid (25.1% and 37.7%, respectively). The acetone and methanol extracts of both plants were active on all microorganisms tested with a small zone diameter indicating weak activity (inhibition zone <12). The methanol extract of *A. setosa* showed moderate activity against *C. albicans* at 30 mg/mL concentration with 13 mm inhibition zone diameter.

PP-5 ETHNOBOTANY, PHYTOCHEMICAL AND BIOLOGICAL ACTIVITY OF 30 INDIGENOUS HERBS IN SOUTHWESTERN, IRAN

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Plants have always had an important role to play in medicine and public health. The knowledge on the use of medicinal plants was acquired by trial and error and handed on from generation to generation. Herbs have been used in many domains, including medicine, nutrition, flavoring, beverages, dyeing, repellents, fragrances, cosmetics, smoking, and other industrial purposes. This study characterizes by phytochemical and biological activity studies such as antimicrobial and antioxidant activities of 30 traditional medicinal plants collected from the alpine of Southwestern Iran, which are important with ethnobotanical principals, including *Satureja bachtiarica*, *S. khuzestanica*, *Thymus daenensis*, *T. carmanicus*, *T. carmanicus*, *Stachys lavandulifolia*, *Ziziphora clinopodioides*, *Mentha longifolia*, and *Dracocephalum multicaule* (Lamiaceae), *Echinophora cinerea*, *E. platyloba*, *Heracleum lasiopetalum*, *Kelussia odoratissima*, *Zaravschanica membranacea*, and

Ferulago angulata (Apiaceae), *Achillea wilhelmsii*, *A. kellalensis*, *Tanacetum kotschyi*, *T. persicum*, *T. chiliophyllum*, *T. polycephalum*, *Artemisia haussknechtii*, and *A. aucheri* (Asteraceae), *Hypericum helianthemoides*, *H. scabrum*, and *H. perforatum* (Hypericaceae), *Allium jesdianum*, and *A. hirtifolium* (Alliaceae), *Myrtus communis* (Myrtaceae), *Valerianasisym briifolia* (Valerianaceae). The results of the study reveal that some of species play an important role in primary healthcare system of these tribal communities. Flora of the studied region appears to be a rich and interesting source for supplementary ethnomedicinal and phytochemical studies. Generally, the extracts and essential oils of the studied species indicated moderate-to-good inhibitory activities against many microbial. In addition, the extracts from the studied medicinal plants had weak-to-good antioxidant activity.

PP-6 CHEMICAL COMPOSITION AND ANTIBACTERIAL ACTIVITY OF THE ESSENTIAL OILS OF ALGERIAN *MYRTUS COMMUNIS* L.

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The aim of the present study was to determine the chemical composition of essential oils extracted from *Myrtus communis* collected at the region of Chlef (Algeria) and to evaluate the antibacterial activity against *Staphylococcus aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. The constituents of essential oil obtained by hydrodistillation of the leaves of *M. communis* from Algeria were examined by GC and GC/MS. A total of thirty four components were identified accounting for 95 % of the oil of *M. communis*. The main compounds were limonene (23.4 %), linalool (15.4 %), geranyl acetate (10.9 %), α -pinene (10.7 %), linalyl acetate (8.2 %) and 1,8 cineole (6.6 %). The antimicrobial evaluating showed that myrtle oil exhibited good antibacterial activity against the bacteria *Staphylococcus aureus*, *Proteus mirabilis* and *Klebsiella pneumoniae*. None of the oil's concentrations was active against

Pseudomonas aeruginosa. It was the most resistant while *Proteus mirabilis* was sensitive more than all tested bacteria. The antibacterial activity of *M. communis* leave oil extract against tested bacteria would differ according to the strains. The results obtained confirm the antibacterial potential of the essential oil of Algerian *M. communis*.

PP-7 ANTIOXIDANT CAPACITY OF METHANOL EXTRACT OF TURKISH ENDEMIC SPECIES *ORIGANUM MINUTIFLORUM* O. SCHWARZ ET P. H. DAVIS

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The genus *Origanum* (Lamiaceae) is represented throughout the world by 44 species and in Turkey by 22 species of 25 taxa, 15 being endemic to Turkey. The species of *Origanum* genera are known in Anatolia as “Mercanköşk” and “Kekik”. *Origanum* species are traditionally used as a spice and expectorant, antispasmodic, sweater, antiseptic in the treatment of gastrointestinal and respiratory tract diseases. *Origanum* species have recently been of great interest, in both academia and the food industry as potential natural additives, to replace synthetic products. *Origanum minutiflorum* O. Schwarz et P. H. Davis is known locally as “toka kekik, toğka kekiği, eşek kekiği, yayla kekiği, sütçüler kekiği, beyaz kekik, boz kekik, dağ çayı, dağ kekiği, and cıngıllı kekik”. It is traditionally used for flavoring all kinds of food products and in folk medicine as an antimicrobial remedy. This commercially important species is also exported for the worldwide spice market. The aim of this study is to reveal antioxidant capacity of methanol extract of *Origanum minutiflorum* aerial parts. The antioxidant capacity of methanol extract were assayed with various methods, DPPH free radical scavenging activity, metal chelating capacity and ABTS radical cation scavenging, including total phenolic compound contents by Folin-Ciocalteu reagent (FCR). The obtained results were compared with standard antioxidants such as Ascorbic acid, BHT and EDTA. *Origanum minutiflorum* extract exhibited stronger free radical-scavenging activity than BHT. As a conclusion of this study, the methanol extract of *Origanum minutiflorum* has beneficial effects on metal chelating, DPPH radical-scavenging and ABTS radical cation scavenging abilities and may thus exert protection against oxidative damage.

PP-8

POLYPHENOL CONTENT AND ANTIOXIDANT ACTIVITIES OF ACETONE EXTRACT OF PISTACIA LENTISCUS FRUITS OF ALGERIA

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Pistacia lentiscus is one of the most used plants in Algerian folkloric medicine. The aim of this study is to evaluate total polyphenol and flavonoid contents and to determine antioxidant properties of the acetone extract of *Pistacia lentiscus* fruits. The quantitative estimation of the total phenolic compounds reveals the richness of this extract in total polyphenols (233±54 µg EGA/mg of extract) and flavonoids (20.7±8.1 µg EQ/mg of extract). Gallic acid and quercetin were used as standards. The antioxidant effect of this extract was assessed *in vitro* using three complementary tests, namely DPPH free radical scavenging assay, metal chelating power and total antioxidant activity. The obtained results showed that *Pistacia lentiscus* fruit extract has a strong scavenging activity against DPPH radical with an IC₅₀ of 13.05±0.21 µg/mL, while BHT (standard) exhibited lower scavenging activity with an IC₅₀ of 54.29±2 µg/mL. An excellent metal chelating activity toward ferrous ions was obtained (IC₅₀=176.2±6.9 µg/mL), also a strong ability to inhibit lipid peroxidation in the test of the total antioxidant activity has been proved. We deduce that the acetone extract of *Pistacia lentiscus* fruits has an important antioxidant activity, which can be explained by its high content on polyphenols and flavonoids. This fruit could be used as potential source of natural antioxidant in many domains.

PP-9

CHEMICAL COMPOSITION OF *ACHILLEA FILIPENDULINA* LAM. (ASTERACEAE) SPECIES FROM TURKEY

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The genus *Achillea* L. includes some popular endemic species of the Flora of Turkey, with important medicinal properties. *Achillea filipendulina* Lam. is a medicinal plant; information about the essential oil compositions of *Achillea filipendulina* Lam. has not been reported. For this reason the objective of this study was to determine the chemical composition of the essential oils of dried aerial parts of *A. filipendulina*. The plants were collected from natural habitats in Bingöl-Muş road 3 km. (Bingöl),

in 2012. Chemical analyses were performed HS/SPME and GC/MS assays. Twenty five components were identified representing 95.94% of the oils. The main compounds of *A. filipendulina* were 1,3-pentadiene (25.64%), 1,8-cineole (19.11%), endo-bornylacetate (12.21%) and borneol (10.39%). It was concluding that the essential oils: 1,3-pentadiene chemotype in *A. filipendulina* was in plants from eastern Anatolian region of Turkey. These essential oils can be used as raw material in medicinal and pharmaceutical purposes.

PP-10

VOLATILE CONSTITUENTS OF *JUNIPERUS CHINENSIS* L., *TAXUS X MEDIA* 'DENSIFORMIS' AND *TSUGA CANADENSIS* (L.) CARRIÈRE FROM CANADA

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The essential oil composition of the leaves of *Juniperus chinensis* L., *Taxus x media* 'Densiformis' and *Tsuga canadensis* (L.) Carrière from Canada were investigated by HS/SPME and GC/MS. Thirtythree, thirty and thirtyone components were identified representing 95.78%, 93.89%, 96.14% of the oil, respectively. Limonene (26.12%), benzene (15.62%), β-myrcene (9.08%) and β-pinene (7.30 %) were found as the main constituents in *Juniperus chinensis*; 1-propanone (36.38%), morpholine (10.95%), methylamine (9.10%) and methanone (8.14%) were identified to be main components in *Taxus x media*; and bornylacetate (26.84%), α-pinene (23.74%), camphene (11.93%) and limonene (6.02%) were identified as the major constituents in *T. canadensis*. The chemical distributions of the essential oil compounds in the genus pattern were discussed in means of chemotaxonomy.

PP-11

WILD ORCHID TUBER COLLECTION AND TRADE IN IRAN WITH IMPLICATIONS ON SUSTAINABILITY AND CONSERVATION

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In Iran, 48 species and subspecies of orchids (Orchidaceae) are found which are distributed mainly along the Alborz Mts in the North and Zagros Mts in the West. Large numbers of orchids are collected for their tubers that are

exported mainly to Turkey for the production of *Salep*. *Salep* refers to dried orchid tubers which is used in ice cream or to make a beverage. Although orchid collection in Turkey has been studied thoroughly, no information is available on wild orchid collection and trade in Iran. This study focused on the identification of harvested species, geographical origin and market analysis of its trade volume, value chain and trade routes. Data were collected by interviewing local collectors, middlemen and wholesalers. Twenty-three species of orchids from 8 genera were found to be harvested for their tubers. Two types of tubers are recognized in the market based on their morphology, an oval and a palmate type. The oval is known to have better quality and fetches a higher price. Plants with oval tubers are categorized into dry and wet plants based on their habitats. At the same time harvesting of different species is done indiscriminately and destructively. Tubers are sold fresh to the middlemen for 4-6 USD/kg/fresh and exported for 350-550 USD/kg/dried. Over-collection caused scarcity in the western parts of Iran, and traders are currently tapping into new areas in Golestan Province. To protect orchid resources we recommend the implementation of a collection ban in heavily collected areas, develop DNA barcoding of confiscated tubers, the establishment of specific Orchid Conservation Areas, and the training of local breeders for sustainable production practices.

PP-12
DEODORIZATION ACTIVITY OF BURAHOL
(*STEELECOCARPUS BURAHOL*) FRUITS
EXTRACTS

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Burahol (*Stelelocarpus burahol*) is an Indonesian medicinal plant which is empirically famous especially in Yogyakarta. The tree is a symbol of unity and integrity of mental and physical properties. Burahol fruit is known as oral deodorant especially for princess in Yogyakarta palace. In this study we examined *in vitro* and *in vivo* malodor reducing activity of extracts of burahol fruits. *In vitro* was conducted by reacting methyl mercaptan (CH₃SH), apple powder (AP) and the extracts, emitted methyl mercaptan was measured by gas chromatography using FPD detector. In this study, ethanolic extract demonstrated the best methyl mercaptan capturing activity (83.31%), followed by butanol and water extracts with methyl mercaptan capturing activity were 64.56 and

53.74%, respectively. *In vivo* experiment was performed by applying 15 mL (1g extract) per day oral solution of ethanolic extract on 20 subjects for 3 days with cross over design. Emitted gas odor was measured using oralchroma®. The burahol extract showed significant deodorization activity compared with placebo (p<0.05).

PP-13
IN VITRO ANTI-DIABETIC POTENTIAL OF
CENTAUREA URVILLEI* DC. SUBSP. *STEPPOSA
WAGENITZ

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Diabetes mellitus is one of the world's major diseases. Some of the *Centaurea* species have been used as Turkish folk medicine for the treatment of peptic ulcer, malaria, common cold, stomach upset, abdominal pain and herpes infections around lips. Methanolic extract of *Centaurea urvillei* subsp. *stepposa* was tested for its α -amylase and α -glycosidase inhibitory activities to establish antidiabetic potential. The antidiabetic activity was evaluated as acarbose equivalents (mmol ACEs/g extract) which is well-known anti-diabetic agent. This methanolic extract showed inhibition on α -amylase and α -glycosidase with 1.37 mmol ACEs/g and 1.15 mmol ACEs/g extract. The extract was exhibited higher activity on α -amylase. The *in vitro* study indicated that methanolic extract of *Centaurea urvillei* subsp. *stepposa* could be used as potent alternative for controlling Diabetes mellitus.

PP-14
PHYTOCHEMICAL, ANTIMICROBIAL,
ANTIOXIDANT AND ANTINOCICEPTIVE STUDY
OF JUNIPERUS PHOENICEA LEAVES IN LIBYA

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This work describes the phytochemical, antimicrobial, antioxidant and antinociceptive investigation of *Juniperus*

phoenicea (Cupressaceae.) leaves extract which is commonly known in Libya as Araar. The study was comparative between two methods of extraction; cold maceration with methanol and hot extraction by Soxhlet. The phytochemical screening results of the total methanolic extract revealed the presence of, carbohydrates, flavonoids, coumarins, saponins, and anthraquinone glycosides. The antimicrobial activity of *Juniperus phoenicea* leaves was evaluated using cup cut diffusion method against five microbial standard strains which were *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus spp.* and *Candida albicans*, the methanolic extracts obtained by the two different methods of extraction seemed to be more active than the chloroform and the petroleum ether layers were they exhibited significant zones of inhibition against almost all the strains which were either equal or more than the standard (phenol) while the hexane layer lack this activity. The free radical scavenging activity of *Juniperus phoenicea* leaves extracts were evaluated using 2,2-diphenyl-1-picryl-hydrazyl (DPPH), where they have showed a strong antioxidant effect in the methanolic layers compared with quercetin standard while the hexane and chloroform extracts did not show any antioxidant activity. The antinociceptive activity of *J. phoenicea* methanolic extract in concentration of (600 mg/kg) was evaluated using hot plate test in mice, the results showed a non-significant increase in the reaction time of animals to thermal pain.

PP-15 COMPARISON OF SOME PLANTS FOR CELL DIVISION

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Vitex agnus-castus L. is popularly used for psoriasis and itching and *Opuntia ficus-indica* (L.) Mill. is mostly used to remove creases. Moreover, it is known for use in relieving pain in cancer patients. In this study, *V. agnus-castus* and *O. ficus-indica* were used for cell renewal treatment, *Mentha* sp. and *Nerium oleander* L. were used to investigate effects on cell division. And tap water was used for control group. Fresh leaves of these plants were dried and then crushed with using liquid nitrogen, after this process plant powders or slurries were put into the 1/20 of ethanol mixed with stored for 48 hours. After this time our extraction was filtered with a filter paper and ethanol was evaporated. Dried extraction was dissolved in tap water (200 mg/mL). Five onions (almost same size) were put in obtained extraction for germination. The root tips were counted and measured day by day and the

contributions of extractions were compared. As a result, *O. ficus-indica* (L.) Mill. was speed germination of the onions up. Also, the least germination was seen in water, *Mentha* sp. and *N. oleander* L. were germinating faster than water. *O. ficus-indica* and *V. agnus-castus* are effective for not only cell regeneration but also cell division.

PP-16 PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY OF *LIFAGO DIELSII* (ASTERACEAE)

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The aerial parts of *Lifago dielsii* (Asteraceae) are used in folk medicine as antidiabetic in South of Algeria. In this study, we report the phytochemical studies using standard methods of analysis and these investigations revealed the presence of triterpenoids, saponins, alkaloids, coumarins, flavonoids and tannins. The different extracts (chloroform, ethylacetate, *n*-butanol) obtained from hydroalcoholic extraction and the MeOH part insoluble in water, were subjected to a quantitative determination of polyphenols and flavonoids (as gallic acid and quercetin equivalent) and to an evaluation of the antioxidant properties using DPPH radical scavenging assay. Our investigation revealed that the ethyl acetate (EtOAc) fraction has the highest amount of phenolic contents (101.2 mgGAE/g) compared to methanolic (MeOH) and *n*-butanolic fractions (*n*-BuOH) (98.1 and 99.0 mgGAE/g extract respectively). Flavonoid content analysis showed that the *n*-BuOH extract had the highest levels (69.9 mgEQ/g extract) followed by the EtOAc extract (40.3 mgEQ/g extract); while the chloroform extract exhibited the weakest content (5.8 mgEQ/g extract). The antioxidant activity assay revealed that the EtOAc extract seems to have the most powerful effect on the DPPH radical scavenging with IC₅₀ = 46.88 µg. The antioxidant effect of *Lifago dielsii* is probably due to the polyphenols proton donors properties.

PP-17 ANTIMICROBIAL ACTIVITY SCREENING OF SOME PINACEAESPECIES

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The current study was carried out for the determination of *in vitro* antimicrobial activities obtained from the etheral extracts of some Pinaceae species collected from Turkey. The extracts of *Pinus nigra* Arn., *Pinus brutia* Ten., *Pinus halepensis* Mill., *Abies equitrojani* (Asch. et Sint. ex Boiss.) Coode et Cullen, *Abies bornmuelleriana* Mattf., *Abies cilicica* (Ant. et Kotschy) Carr., *Abies nordmanniana* Lk., *Cedrus libani* A. Rich, *Picea orientalis* L. were examined against *Staphylococcus aureus* ATCC 25923, *S. aureus* ATCC 43300 (MRSA), *Bacillus subtilis* ATCC 6633, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, *Klebsiella pneumoniae* RSKK 574 and *Candida albicans* ATCC 10231. The disc diffusion method was used to determine the antimicrobial activities of extracts. The etheric extracts of *Abies bornmuelleriana*, *Cedrus libani*, *Pinus halepensis* shave no antimicrobial activity against all bacteria and fungus. Except *Abies bornmuelleriana*, *Cedrus libani*, *Pinus halepensis*, all the tested extracts showed weak antimicrobial activity against the various tested bacteria comparing with the standarts. No antimicrobial activity was observed against *C. albicans* for all the extracts.

PP-18 ESSENTIAL OIL COMPOSITION OF THREE PINUS L. (PINACEAE) TAXA FROM CANADA **Alpaslan Koçak¹, Ömer Kılıç²**

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In this study three *Pinus* L. taxa from Canada (*P. strobus* L., *P. parviflora* Siebold & Zucc. and *P. mugo* Turra subsp. *mugo*) have been studied to determination of the taxonomical classification based on chemical characters. For this purpose, essential oil leaves of studied taxa were investigated by HS-SPME and GC/MS. Thirty eight, thirty three and thirty nine compounds were identified representing 95.90%, 95.07%, 95.79% of the oil, respectively. α -pinene (32.96%), β -myrcene (27.72%) and β -pinene (8.01%) in *P. strobus*; α -pinene (25.56%),

caryophyllene (13.21%), germacrene D (6.71%), limonene (6.21%) and camphene (5.68%) in *P. parviflora*; 3-carene (36.54%), *p*-cymene (18.03%) α -pinene (9.00%) and limonene (5.09%) in *P. mugo* subsp. *mugo* were identified as main components. It was concluding that the essential oils; α -pinene chemotype in *P. strobus* and *P. parviflora*, 3-carene chemotype in *P. mugo* subsp. *mugo* were in plants from Waterloo region of Canada. The relationship chemotypes with soil type and climatic conditions of collected regions were assessed. The chemical distributions of the essential oil components in the genus pattern were discussed in means of chemotaxonomy.

PP-19 ESSENTIAL OIL COMPOSITION OF THUJA L. (CUPRESSACEAE) SPECIES FROM CANADA

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The oils obtained by HS-SPME from leaves of *Thuja occidentalis* L. and *Tetraclinis articulata* (Vahl) Masters (synonym: *Thuja articulata*) growing in Canada, were analyzed by GC/MS. Thirty one and fifty one compounds were identified representing 92.30 % and 93.42 % of the oil, respectively. The main constituents of *T. occidentalis* were bornylacetate (30.00 %), limonene (7.56 %), camphor (7.33 %), α -pinene (7.18 %) and δ -cadinene (6.01%), whereas α -pinene (32.67 %), 3-carene (18.29 %), β -myrcene (11.69%) and bornylacetate (5.88 %) were the major constituents of *Tetraclinis articulata*. The results showed that *T. occidentalis* chemotype was bornylacetate whereas α -pinene was chemotype of *Tetraclinis articulata*. HS extraction needs much smaller amount of plant than hydrodistillation technique. Although the aromatic profiles of HS-fractions and oils shows several quantitative differences, HS-SPME can lead to routine control analysis of aromatic and medicinal plants in a slight amount.

PP-20
EFFECTS OF CADMIUM AND ALUMINIUM UPTAKE ON ANTIMICROBIAL ACTIVITY OF THE MEDICINAL *DRIMIA ELATA* (JACQ.) HYACINTHACEAE

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Plant uptake and accumulation of heavy metals is one of the major sources of metal contamination in herbal products. This study examined the interactive effects of Cd and Al on physiology of one of the top selling South African medicinal plant species *Drimia elata* (Jacq.). Plants were exposed to different concentrations of Cd and Al for 6 weeks. The highest amount of Cd (83 mg/L) was recorded in bulbs grown in the combinational treatments of Cd/Al 5/1000 mg/L. Plants exposed to heavy metal stress exhibited a marked reduction in the plant biomass in all the treatments except for Cd 2 mg/l and Al 500 mg/l. High levels of free-proline was recorded in the plants treated with Al 1500 mg/L (557 µmol/g FW). This was 6-fold higher than the control plants. There was a significant reduction in the total chlorophyll being 3-fold lower than the control at Al 1500 mg/L. Heavy metal stress exhibited deleterious effects on the phytochemical compositions in *D. elata*. The reduction in the amounts of total phenolics and flavonoids contents in the metal contaminated plants which could be responsible for the poor antibacterial activity recorded in all the treatments except for Cd 2 mg/l and Al 500 mg/L. These results raise concern on the quality of the phytomedicinal properties of *D. elata* grown under heavy metal stress.

PP-21
CHEMOPROTECTIVE EFFECT OF *WARIONIA SAHARAE* AGAINST LIVER INJURY INDUCED BY VALPROIC ACID IN RATS

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Hepatoprotective agents of herbal origin are widely available for the treatment of different types of liver disorders. The use of valproic acid (VPA) as a broad-spectrum antiepileptic is associated with a rare, but fatal idiosyncratic liver toxicity. *Warionia saharae* which is an endemic to the northwestern of the African Sahara desert is used in folk medicine for their gastrointestinal anti-inflammatory effects. Based on these pharmacological properties and for the first time, this study was designed to determine the possible protective mechanism of the acetate extract of *W. saharae* (AEWS) against liver injury induced by VPA. The male *Wistar* rats were intraperitoneally treated by 300 mg/kg b.w of VAP for 14 days as an experimental model. The co-administration (300 mg/kg b.w) of AEWS caused significant reversal in lipid peroxidation (80%) and in enzymatic leakage (61-87%) and produced an enhancement of hepatocellular defense: reduced glutathione level, catalase and superoxide dismutase activities (65-83%). AEWS attenuated the VAP-induced elevation in hepatic tumor necrosis factor- α (65%), nitric oxide levels (77%) and caspase-3 activity (72%). The histological changes were also recovered by AEWS. Obtained results revealed that *W. saharae* could be considered as successful chemoprotective agent.

PP-22
THE PROTECTIVE EFFECT OF BUTANOLIC EXTRACT FROM *RHANTHERIUM SUAVEOLENS* ON VALPROIC ACID INDUCED HEPATOTOXICITY IN PREGNANT MICE

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The objective of the present study was to investigate the ability of *n*-butanol extract obtained from flowers of endemic Algerian species belonging to the family of

Compositae (*Rhantherium suaveolens*) and vitamin E to modulate valproic acid-induced hepatotoxicity and oxidative damage in pregnant mice. Valproic acid (VPA), a common treatment of epilepsy and other diseases, is known to have severe toxic effects on liver both in experimental animals and in humans. In this present study, we investigated the prooxidant effect of VPA and its implication on hepatic cells. VPA injection in mice at dose of 300 mg/kg induced hepatic dysfunction revealed by a significant increase in serum of AST and ALT. Oxidative stress in liver cells was induced by VPA since a significant reduction of GPx activities and GSH levels, and significant increase of MDA level were observed. The protective effect of vitamin E (100 mg/kg) and butanolic extract (100 mg/kg) against oxidative stress induced by VPA was also investigated. Indeed, the pretreatment of mice with butanolic extract protected liver cells from oxidative stress permitting the prevention of hepatic dysfunction on maintaining the normal level of serum transaminases, preventing lipid peroxidation and maintaining antioxidant defense system. These phenolic compounds have also antioxidant power that confers them protection against oxidative stress generated in liver by VPA. The *In vitro* study confirmed the potential of this extract as antioxidant using DPPH method.

PP-23

ANTIOXIDANT ACTIVITY AND FAVONOIDS OF *THYMUS NUMIDICUS* *THYMUS* (Poiret)

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The *Thymus* genus includes over 400 species that are more abundant in the Mediterranean area and Iran; 26 of which grow in Algeria, nine of them are endemic. This genus is known for its uses in food, mainly for the flavor, aroma and preservation and also in folk medicine. *Thymus numidicus* (Poiret), characterized by pink flowers, is an endemic species to northern Algeria and Tunisia. In Algerian traditional and folk medicine, *T. numidicus* is well known for its expectorant, antitussive, antiseptic, antispasmodic and antihelmintic properties, as for many other *Thymus* spp. Air-dried and powdered aerial parts of *T. numidicus* were macerated in ethanolic solution at

room temperature. The residue was filtered, concentrated, and then successively fractionated with increase polarity solvents. The present work was performed to evaluate the antioxidative activity of the obtained fractions and to purify the antioxidant molecules. The capacity of the *T. numidicus* fractions to inhibit the stable free radical 1,1-diphenyl-2-picrylhydrazyl was measured by electron spin resonance spectroscopy. The IC₅₀ values showed that *T. numidicus* had a potential antioxidative activity which was correlated with the total phenolic compounds' levels. Some flavonoids were purified from the most antioxidant fraction and showed high antioxidant activity. Compared to reference antioxidants (quercetin and vitamin E) and standard extracts (Pycnogenol and grape marc extract), it was observed that *T. numidicus* has high antioxidant potential, better than those of some reference compounds.

PP-24

ANTINOCICEPTIVE ACTIVITY OF THE AERIAL PART OF *BALANITES AEGYPTIACA* METHANOL EXTRACT IN MICE

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Balanites aegyptiaca (L) Del has been used in a variety of folk medicines in Malaysia, Bengal, India and Myanmar, for the treatment of various complaints. The tribal people are using the aqueous juice of *Balanites aegyptiaca* for relieving the pain. Herein, the fractions and aqueous residue of the methanol extract of the dried aerial part of *Balanites aegyptiaca* was evaluated for their antinociceptive activity in mice. The antinociceptive activity was studied using the hot-plate method and acetic acid induced writhing test. The present study showed that the butanol fraction of the methanol extract of *Balanites aegyptiaca*, at the oral doses 100 and 200 mg/kg/day, produced a significant (P<0.01) analgesic effects in both the tests compared to control treatment group. No analgesic activity was observed with dichloromethane fraction and aqueous residue. The phytochemical studies of the methanol extract and its subsequent solvent fractions revealed that the plant is a rich source of carbohydrates, proteins, alkaloids, flavonoids, tannins and saponins. The observed results provide the scientific basis and safe folk use of this plant in the treating of mild type of pain, that may possibly be mediated centrally and peripherally.

PP-25
MORPHO-ANATOMICAL, PALYNOLOGICAL
AND SEED SURFACE PROPERTIES OF
ASTRAGALUS TMOLEUS

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Astragalus (Fabaceae) has been used in Traditional Chinese Medicine for thousands of years. They have been used in the treatment of diabetes mellitus, nephritis, leukaemia and uterine cancer, but also for their hepatoprotective, antioxidative, immunostimulant, anti-inflammatory, analgesic, hypotensive sedative and cardiotoxic activities properties. *Astragalus tmoleus* Bunge is member of the *Pterophorus* section and consists of spiny cushion forming shrub. *A. tmoleus* is an element of the Mediterranean phytogeographical mainly distributed in stony slopes of the south-west and central Anatolia region. Due to extraction of tragacanth and selenium, as well as a valuable tool in pharmacy, this is also important economically and ecologically. In this study, morphological, anatomical, pollen characteristics and seed surface properties of *A. tmoleus* were investigated in detail. Morphological characters such as the shape of paripinnate leaves, stipules and bracts, the flower number in the inflorescence, the stenonychioid type of standard and reniform type of seed can be helpful to distinguish of *A. tmoleus*. There is secondary growth in stem anatomy. The stem of this species has got tragacantha canals in pith. Sclerenchyma tissue is located on the vascular bundles in the rachis. *A. tmoleus* has equifacial leaves. The vascular bundles are surrounded by a bundle sheath. The pollen grains of *A. tmoleus* are tricolpate and subprolate. The exine sculpturing is microreticulate. Scanning electron microscopy (SEM) is used to determine the morphology of pollen and seed.

PP-26
CHANGES IN ESSENTIAL OIL QUANTITY AND
QUALITY OF KHORASANI THYME
INFLUENCED BY HABITAT AND FIELD

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Thymus species and their essential oils were studied in Khorasan Razavi province for 2007-2011. For this purpose, top flowering branches of *Thymus transcaspicus* (Lamiaceae) were harvested from a number of different sites. The samples were dried in shade and milled in

laboratory. Essential oils were extracted by two types of distillation: Hydro-distillation and Clevenger apparatus designed according to the British Pharmacopoeia. The essential oils were analyzed using GC and GC/MS to identify the chemical constituents. Analysis of the collected data were compared with *Duncan's* new multiple range test (MRT). The major essential components as thymol (75.40%), carvacrol (5.49%), p-cymene (4.99%), cineole (37%) and terpinene (4.26%) were identified from the natural habitat whereas in the field harvest, thymol (44.2%), carvacrol (6.66%), β -pinene and p-cymene (16.32%). The results showed that the lowest level of carvacrol (3.53%) and the highest γ -terpinene (14.08%) and α -terpinene (2.85%) were achieved from the collected seeds at Line region.

PP-27
THE EDIBLE AND MISCELLANEOUS USEFUL
PLANTS IN MARMARIS (SOUTHWEST TURKEY)

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This study has an aim to identify the various folk usages of the plants in Marmaris (Muğla) district. The field works have been done from December 2008 to August 2010. The information was obtained from local people by means of direct interviews and classified according to the use of plants for medicinal, food, tea, spice, fodder, as well as for miscellaneous uses. The collected specimens are kept in the Herbarium of the Faculty of Pharmacy, Istanbul University (ISTE). This presentation is a part of master thesis, named as "Ethnobotanical Study in Marmaris District (Muğla)". In the working place 80 plants belonging to 35 families have edible and miscellaneous uses. Among these plants, 53 species are used as edible plants, 33 species are used for different purposes. The most-used plant families are the Labiatae (10 species), Compositae and Rosaceae (5 species each), Liliaceae and Leguminosae (4 species each). In the edible plants, 41 species are used for food; 8 species for tea; 7 species for spice. Most commonly used parts are fruit, leaf and aerial part. 33 taxa have miscellaneous uses; these are 9 taxa as broom/ basketry; 7 taxa for animal fodder; 4 taxa as decorative; 2 taxa as fuel; and 18 taxa for different purposes.

PP-28

HEPATOPROTECTIVE ROLE OF *GAILLONIA SP.* EXTRACT AGAINST PCP-INDUCED TOXICITY IN WISTAR ALBINOS RATS

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Natural products of plant origin are still a major part of traditional medical systems in developing countries. In the present study, the antioxidant properties and protective effect of the butanolic extract isolated from aerial parts of *Gaillonia* sp. were investigated. The antioxidant activities of the plant extracts were evaluated *in vivo* in terms of its inhibition of lipid peroxidation as well as its protective effect against pentachlorophenol (PCP) toxicity. Female Wistar Albino rats were used in this study, PCP (20mg/kg) and plant extract (100 and 50mg/kg) were administered daily by gavages for two weeks. The data showed a significant increase ($p < 0.001$) in the plasma and liver LPO levels of animals treated with pesticide while it was decrease in plant extract treated. In addition, PCP caused significant decreases ($p < 0.001$) in antioxidant enzymes (GPx); (GSH); and (CAT) activities, and this decrease was reduced in groups treated with plant extract. Moreover, PCP-induced hepatotoxicity by increasing serum enzymes activity; while, these enzymes were restored to control value in animals treated with plant extract. The decrease in serum enzymes and LPO levels and the increase in GSH and GPx enzymes activities revealed the antioxidant property of this extract. The plant extract completely prevented the toxic effect of PCP on the above serum parameters.

PP-29

FLAVONOIDS AND ANTIOXIDANT ACTIVITY OF BUTANOLIC EXTRACT FROM *CHRYSANTHEMUM FONTANESII*

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The genus *Chrysanthemum* (Compositae) is represented by about 20 species in Algeria. As part of our ongoing program of research on plants of this genus, we report our results on *C. fontanesii* B. et R., an endemic species in the Maghreb, which has not been previously investigated. After extraction of aerial parts of *Chrysanthemum fontanesii* with a MeOH:H₂O (80:20) and separation of the *n*-butanolic soluble extract using different chromatographic methods, we isolated several flavonoids. The structures of the isolated compounds were elucidated by UV, ¹H NMR, ¹³C NMR, and MS analysis. All these results were in good agreement with the literature data. Antioxidant activities and membrane stabilizing activity of *n*-butanolic extract from aerial parts of *Chrysanthemum fontanesii* were investigated. The inhibition of the formation of malondialdehyde (MDA) *in vitro* and the scavenging of DPPH were assayed. The experimental results show that butanolic extract have antioxidant activities *in vitro*. The extract showed a high antioxidant effect, especially scavenging of DPPH anions and inhibition of lipid peroxidation (with IC₅₀ values of extract being 11.36 µg/mL and 171.34 µg/mL, respectively) compared to ascorbic acid (IC₅₀=5 µg/mL and 20 µg/mL respectively).

PP-30

PHYTOCHEMICAL STUDY AND IN VITRO ANTIMICROBIAL ACTIVITY OF *MYRTUS COMMUNIS* L (MYRTACEAE) IN BOUMERDES MOUNTAINOUS REGION (ALGERIA)

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Myrtus communis L. (Myrtaceae) is widespread in the Mediterranean basin. It is among the most important medicinal plants in Algeria that is known for its antifungal and antimicrobial properties. This aromatic and medicinal plant is renowned for its wealth of essential oil and polyphenolic compounds. Despite its plethora of uses for treating various diseases, it has garnered very little scientific interest so far, particularly in Algeria. For this study, the leaves were collected in spring (in March) from the mountainous region of Boumerdes, in northern Algeria. By its geographical position, this region exhibits

an important ecological and floristic diversity, giving rise to a very strong tradition in herbal medicine practices. In such a propitious context, the aim of this study was to enhance *M. communis* as a medicinal herb. The phytochemical screening methods are used as mentioned in Lahlou, 2004. Methanol and acetone (solvent) are used respectively for polyphenol and tannin fractions. For their antimicrobial activity, extracts of tannins and polyphenols were screened against five pathogenic bacterial strains and two pathogenic yeast strains using agar well diffusion method. The phytochemical analysis results showed a remarkable combination of chemical components including a high content in tannins, in leucoanthocyanins, glucosides, flavonoids, saponosides and in coumarins. The tannins and the polyphenols have strong antimicrobial activity against all the species. The maximum zone of inhibition was noted for polyphenol and tannin extracts against *Staphylococcus aureus* (24.5 mm, 21.33 mm) and an antifungal activity against *Candida albicans* (17 mm, 18mm). These results indicate to some benefits of *Myrtus communis* leaves which can use to treatment the microbial infection.

PP-31
CHARACTERISATION OF VOLATILE COMPOSITION OF *CURCUMA LONGA* AND *CARUM CARVI* (WITH CRYOGENIC GRINDING) BY HEADSPACE SOLID-PHASE MICROEXTRACTION (HS-SPME) AND SIMULTANEOUS DISTILLATION-EXTRACTION (SDE) COUPLED TO GC-MS

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Two analytical procedures were applied, HS-SPME and steam distillation, coupled to GC/MS to analyse the volatile composition of *Curcuma longa* (CL) rhizome and *Carum carvi* (CC) seeds treated by cryogenic grinding. The results showed significative variation of chemical composition as function as the dimension of particles. More than 70 of volatile compounds which belonged to distinct chemical families were analysed. SDME led to the identification of mainly high molecular weight sesquiterpenes, acids and esters. Given that SDE involves high temperatures, heat-sensitive compounds may undergo chemical alteration or artefacts may appear. The results show that SPME was useful for the analysis of alcohols and hydrocarbons of low molecular weight and

high volatility that are involved in the characteristic volatile profile of CL rhizome and CC seeds and its sensory perception.

PP-32
KINETIC STUDY OF VOLATILE OIL OF *CUMINUM CYMINUM L.* SEEDS EXTRACTED BY ACCELERATED TECHNIQUES ASSISTED BY MICROWAVE INTRODUCING THE CRYOGRINDING

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Steam distillation assisted by microwave (SDAM) and hydrodistillation assisted by microwave (HDAM) are respectively advanced steam distillation (SD) and hydrodistillation techniques (HD), in which a microwave oven is used in the extraction process. They are considered as accelerated techniques extraction performed at atmospheric pressure. The effect of the cryogrinding (CG) on the yields and composition of volatile oils was studied. Isolation and concentration of volatile compounds are performed by a single stage for the extraction of volatile oil from Algerian (Sahara) *Cuminum cyminum* seeds. The essential oils extracted by these two methods time were quantitatively (HDAM: 2.2%, HDAM-CG: 2.5%, SDAM: 3.2% and SDAM-CG: 3.4% in yield) and qualitatively (aromatic profile in cuminaldehyde as a function of time, HDAM-CG: 20.50-53.35 % and SDAM-CG: 21.6866.60%), no similar. These methods yield volatile oils with higher amounts of more valuable oxygenated compounds, and allow substantial savings of costs, in terms of time, energy and plant material. SDAM and HDAM are green technologies and appear as a good alternative for the extraction of essential oils from aromatic plants.

PP-33

EVALUATION OF PHARMACOLOGICAL AND TOXICOLOGICAL EFFECT OF *MARRUBIUM VULGARE* (L) AQUEOUS EXTRACTS

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Marrubium vulgare (L) is a medicinal plant belonging to the genus *Marrubium* widely used in Mediterranean countries, especially Algeria. In this study of pharmacological and toxicological effect, aqueous extract of this plant was orally administered to mice in single doses 0-15g/kg by gavage. The performance of the aqueous extract with distilled water is 8.75±2.05%. The assay results of polyphenols from the aqueous extract of the flowers and leaves were higher (55.77±3.02 mg GAE/g) than those of flavonoids (7.86±0.89 mg QE/g and 15.65±1.48 mg RE/g). On the other hand the study of the acute toxicity of the aqueous extract orally given to mice at the dose of 12g/kg showed severe symptoms such as breathing problems, disturbances in body weight, and changes of some hematological parameters (WBC, RBC, HGB) and biochemical parameters (ALP, ALT, ASAT). The histopathological study of the liver and kidney showed clearly that the cellular architecture (lobular and tubular) of the parenchyma of both organs is well preserved. However, discrete vascular and sinusoidal congestion with foci of necrosis consisting essentially of inflammatory cells (neutrophils and lymphoplasmocytes), dilated sinusoids, as well as tissue damage were observed in the hepatic tissue. Furthermore, examination of the kidney revealed the presence of a large vascular congestion. A discrete lesion of subacute interstitial nephritis and cytolysis were also observed in some treated mice.

PP-34

EFFECTS OF *ROSMARINUS OFFICINALIS* L. AQUEOUS EXTRACT ON ACUTE INFLAMMATION

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In this study, *Rosmarinus officinalis* L. aqueous extract was evaluated for anti-inflammatory activity by using the model of Carrageenan-induced rat paw edema. Two doses of the aqueous extract (1500 mg/kg and 3000 mg/kg) were given orally by gavage technique, and then carrageenan was injected into the right hind paw of the rat. The extract which was found rich in phenolic content (196.63±3.09 mg GAE/ g E), and flavonoids (2.22±0.09 mg RE/ g E), has shown a good inhibitory action (44.62% in the third hour for the higher dose. *: p<0.1) and close to that of aspirin that was used as a standard (31.87 % in the third hour for 200 mg/kg aspirin**: p<0.05). The same effect was observed macroscopically on the gastric ulcer for both substances. However, the tissue alterations of the stomach were different at the histological study.

PP-35

HEPATOPROTECTIVE EFFECT OF *GENISTA QUADRIFLORA* AGAINST ETHANOL INDUCED TOXICITY

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Excessive ethanol intake induces severe tissue damage particularly in the liver through the generation of reactive oxygen species. This study was designed to examine the effect of *n*-butanolic extract of *Genista quadriflora* for its protective potentials against ethanol induced toxicity. Male Wistar Albino rats were used in this study, ethanol (3 g/kg every 12 hours for 3 doses) and plant extract (100 and 2000mg/kg) were administered by gavages. At the end of the experiment, blood samples were collected for biochemical measurements: serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase, cholesterol, triglycerides and glucose. Liver was fixed in 10% formal saline for histological studies and others homogenized for lipid peroxidation, reduced glutathione,

glutathione peroxidase, and catalase analysis. It was found that combined *Genista quadriflora* (200 mg/kg) extract-ethanol treatment significantly decreased TBARS level and increased reduced glutathione, glutathione peroxidase, and catalase activity compared to the ethanol group ($p < 0.01$). The administration of the extract 200 mg/kg temporized, the effect of ethanol and normalizes the value of (AST) and (ALT) enzymes against the witness. Also, significantly decreased of cholesterol and glucose in groups treated with extract 200 mg/kg. Histological studies of the rat liver showed a marked alterations in cellular structure in group treated with ethanol. Histopathological changes induced by alcohol were significantly improved by the extracted contribution to the groups treated with ethanol. Results of in vivo experiments showed that the *n*-butanolic extract of *Genista quadriflora* inhibited lipid peroxidation, protected the experimental animals from hepatic toxicity and maintained the levels of antioxidants in dose dependent.

PP-36 ETHNOBOTANICAL ASPECTS OF SOME *ALYSSUM* L. TAXA IN TURKEY

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Ethnobotany is the systematic study of the relationships between plants and people. It is not simply the study of the human "use" of plants; rather, ethnobotany locates plants within their cultural context in particular societies, and situates peoples within their ecological contexts. Ethnobotanists examine: the culturally specific ways that humans perceive and classify different kinds of plants, the things humans do to plant species, such as destroying "weeds" or "domesticating" and planting specific kinds of food and medicinal plants, the ways in which various members of the plant world influence human cultures. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources. The plant-based, traditional medicine systems continue to play an essential role in health care, with about 80% of the world's inhabitants relying mainly on traditional medicines for their primary health care. According to World Health Organization, medicinal plants would be the best source to obtain a variety of drugs. Therefore, such plants should be investigated to better understand their properties, safety and efficacy. Genus *Alyssum* L. has been known with up to 230 species in the world with major distribution in Eastern Europe and Turkey. Most of these species, especially *Alyssum* section *Gamosepalum* (Hauskn.) T. R. Dudley has only known from Turkey and Armenia. In this research ethnobotanical uses of some *Alyssum* L. taxa growing in Turkey are reviewed.

PP-37 ANTIOXIDANT AND CYTOTOXIC ACTIVITIES OF *ALYSSUM LINIFOLIUM* Steph. Ex Willd. var. *LINIFOLIUM* (BRASSICACEAE)

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Turkey is rich in terms of flora contains a large number of plant species and diversity of nature in medicinal plants were collected and cultured that have different climatic and ecological conditions and is one of the few countries worldwide. Genus *Alyssum* L. has been known with up to 230 species in the world with major distribution in Eastern Europe and Turkey. This study was aimed to determine the in vitro antioxidant and cytotoxic activities of methanolic extract obtained from *Alyssum linifolium* var. *linifolium*. The extract was screened for its possible cytotoxic activity by brine shrimp (*Artemia salina* L.) lethality assay. The brine shrimp lethality assay represents a rapid, inexpensive and simple bioassay for testing plant extracts bioactivity which in most cases correlates reasonably well with cytotoxic properties. The antioxidant activity of the extract was determined by its ability to inhibit linoleic acid peroxidation (β -carotene-linoleic acid assay) and DPPH radical scavenging activity. Antioxidants have of great importance for the prevention of oxidative stress that to cause in many illness. Antioxidants can inhibit oxidative reactions in vivo, and aid in functional performance of enzyme systems for self-defense mechanisms within cells. The methanolic extract of *A. linifolium* var. *linifolium* showed most prominent activity in DPPH free radical scavenging activity at 1.0 mg/mL (86.7%) and also showed the highest activity with 1000 μ g/mL (%77.7 mortality) in the brine shrimp lethality assay. The mortality increased with increasing the concentration. Maximum mortalities took place at a concentration of 1000 μ g/mL whereas least mortalities were at 10 μ g/mL concentration.

PP-38 THE ART OF PAINTING WITH DRIED FLOWERS AND LEAVES

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Plants are one of the most important links of the nature. We spare the most precious spaces in our homes to flowers, sometimes for inspiration and sometimes, simply to benefit

from the peace greenery gives our souls. Flowers have always had an important part in Turkish life and culture, affecting art in stylized form from tiles to fabrics to poems and songs, and everyday life from cooking to naming children. Tulips, roses, carnations, hyacinth, magnolia and many others have a special place in Turkish culture. Turkey has been and remains a center of origin and an essential source of important global genetic resources for numerous agricultural, horticultural, medicinal and ornamental plants. In addition to this, Turkey is one of the richest countries of the world in biodiversity, hosting 75% of all plant species in Europe. For the Ottomans, flowers meant passion, tenderness, visual joy. Gardens were a synecdoche for the order of the world and for evocation of paradise. Mehmed II, Conqueror of Istanbul, posed for a miniature painting, not brandishing a sword, not displaying panoply of power, but smelling a flower. We have samples of real flowers from the Ottoman Empire in the form of dried flower arrangements. We can see some examples of this art in the Nurhan Atasoy's beautifully printed book on the Ottoman love of horticultural art. All of the materials used in this art are natural. Flowers, leaves, or even vegetable peels briefly by bringing together and may occur in great postcards, invitation cards or wonderful paintings. In this paper, this ancient Ottoman art are discussed.

PP-39
ETHNOBOTANY OF SOME APIACEAE SPECIES FROM EUROPEAN TURKEY (THRACE REGION)

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The Apiaceae (Umbelliferae) family is represented by approximately 400 genera and 3.500 species worldwide. Apiaceae family is the 3rd largest family in terms of genus in Turkey. Also in terms of species number, it is the eighth largest family with approximately 455 species and approximately 33 % of these are endemic. The members of Apiaceae family have economic value in the world. The plants of this family have long been known as an important source of medicine, food, spice and as ornamentals worldwide and as well as in Turkey. So we focused on to study the ethnobotanical usages of some Apiaceae plants which have recorded usages in Turkey and growing in Thrace region (A1(E) and A2(E) grids). The usages of 15 plants especially used as food and medicine in Turkey; *Berula erecta* (Huds.) Coville, *Caucalis platycarpos* L., *Chaerophyllum byzantinum* Boiss., *Crithmum maritimum* L., *Daucus carota* L.,

Echinophora tenuifolia L. subsp. *sibthorpiana* (Guss.) Tutin, *Falcaria vulgaris* Bernh, *Heracleum sphondylium* L. subsp. *ternatum* (Velen.) Brummitt, *Hippomarathrum cristatum* Boiss, *Lagoecia cuminoides* L., *Oenanthe pimpinelloides* L., *Orlaya daucooides* Greuter, *Scandix pecten-veneris* L., *Smyrniolum olusatrum* L. and *Tordylium apulum* L. are given in this study.

PP-40
TAXONOMY OF ASTRAGALUS MONGHOLICUS COMPLEX BY MEANS OF LC-TOF/MS BASED METEBOLOMICS

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Radix Astragali, the dried root of *Astragalus membranaceus* and *A. mongholicus*, is a famous traditional Chinese medicine with the medicinal history of more than 2000 years in China. However, sharing similarities in morphology, the taxonomy of these plants has been debated for a long time. According to literature, it is supposed that Radix Astragali might cover three species namely *Astragalus membranaceus*, *A. mongholicus* and *A. borealimongholicus*. They are consisted of a group named "Astragalus mongholicus complex". In this study, the approaches of ethnobotany and LC-TOF/MS based metabolomics were used to determine the taxonomic status of *Astragalus mongholicus* complex. The ethnobotanical survey revealed that *Astragalus membranaceus*, *A. mongholicus* and *A. borealimongholicus* were with similar functions but with some differences among morphological traits, distribution area and habitats. According to the folk classification system, the local people believed that the complex included three different species. Their root samples were collected from 15 sites in northern China and discriminated using LC-TOF/MS based metabolomics. The results showed that there are similar major active compounds such as calycosin-7-O-β-glucopyranoside, ononin, calycosin, formononetin, isoastragaloside I, astragaloside II, isoastragaloside II, cyclocephaloside II, astragaloside I, astragaloside IV, and astragaloside III in their roots. The quantity of these compounds, however, is different. We concluded that the roots of *Astragalus mongholicus* complex can be used as Radix Astragali for medicinal purposes, but cannot be treated as one species taxonomically. To examine the folk classification of *Astragalus mongholicus* complex, GC-TOF/MS and LC/MS based metabolomics will be used to analyze the stems and leaves, respectively.

PP-41
GENETIC DIVERSITY ANALYSIS OF
***XANTHOCERAS SORBIFOLIUM* BUNGE AMONG**
THREE POPULATIONS IN CHINA BY RAPD
MARKERS

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Xanthoceras sorbifolium Bunge, is distributed in northern part of China and called 'yellowhorn', 'shiny leaf yellowhorn', 'goldenhorn', and 'Chinese flowering chestnut'. Seed has been traditionally used for source of edible oil and medicine in China and recently considered a good source of biodiesel.

The analysis of genetic diversity within the species and populations is needed for the study of modern use of the species, biodiesel production. Seeds were collected from several plantations and farms in three provinces, i.e., Inner Mongolia (IM), Liaoning (LN), and Shandong (SD), China, and DNA were extracted from seeds and analyzed with Random Amplified Polymorphic DNA (RAPD) markers. Mean genetic variation was measured by polymorphism percentage (42.10%). Among three populations, SD showed the highest values in polymorphism percentage (57.89%). Genetic diversity, based on the total loci, was estimated as total genetic diversity of the species, $H_t = 0.27$ and mean within population genetic diversity, $H_s = 0.16$. The average genetic diversity ranged from 0.50 to 0.98 within populations. While two populations, IM and LN, showed high similarity, SD is genetically distant from other group in UPGMA cluster analysis. The results of genetic diversity of the species will be beneficial for conservation of traditional and/or special plant genetic resources and further improvement program. ***Financial supports were given to the corresponding author for this study by the Rural Development Administration, Republic of Korea (Project No. PJ008229) and the Ministry of Education, China (Project No. MS2012DBLY017).

PP-42
THE ANTI-CANCER COMPOUNDS FROM THE
ROOTS OF *PRISMATOMERIS CONNATA*
(RUBIACEAE)

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The genus *Prismatomeris* in Rubiaceae includes about 16 species that are mainly distributing in tropical and subtropical regions of the old world. There are one species and two subspecies native to south and southwest China: *P. connata* grows in Guangxi, Guangdong and Fujian provinces, a subspecies *P. connata* ssp. *hainanensis* in Hainan province, and *P. tetrandra* ssp. *multiflora* in Yunnan province. Their roots are named "Huanggen" in Chinese traditional medicine and are used for treating hepatitis, anaemia, leucocythemia, and pneumoconiosis. To date, we have isolated a new anthraquinone 1-hydroxy-2,3,4-trimethoxy-7-methyl-9,10-anthraquinone that has not been identified before, and two rare tetrahydroanthraquinones, namely prisconnatanones A (PCONCIN1) and B, as well as fifteen known anthraquinones and six known anthraquinone glycosides from the species *P. connata*. The anti-cancer activities of these isolated anthraquinones were tested in vitro using MTT method. Here, we found that some of these compounds (i.e. PCON6, PCONCINI) were very potent against human lung cancer cell lines (H520, A549, LAC) with IC_{50} ranging from 3.61–60.34 μ M. Further studies demonstrated that suppression of H520 cell growth by PCON6 was associated with its induction of S phase cell cycle arrest, which was further supported by a decrease in *cdc2* expression in PCON6-treated cells. The other compound PCONCIN1 exhibited a high activity in against human prostate cancer cell line (PC-3) with $IC_{50} = 3.4$ μ M after 72 h of incubation, as well as A549 with $IC_{50} = 1.2$ μ M after 48 h of incubation. The mechanism of PCONCINI action is under further investigation.

PP-43
REVERSED-PHASE HIGH PERFORMANCE
LIQUID CHROMATOGRAPHIC (RP-HPLC)
METHOD FOR DETERMINATION OF
TACROLIMUS IN PHARMACEUTICAL
OINTMENT FORMULATION

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Tacrolimus was discovered in 1984 from the fermentation broth of a Japanese soil sample that contained the bacteria

Streptomyces tsukubaensis. Tacrolimus, a macrolide agent, derived from *Streptomyces tsukubaensis*, inhibits T-lymphocyte activation through a process that is thought to involve its binding to an intracellular protein, FKBP-12. The present study describes a simple and stability-indicating reverse phase high-performance liquid chromatography (RP-HPLC) method for the determination of tacrolimus (FK506). We developed a simple extraction in ointment tacrolimus by liquid-liquid extraction using acetonitrile. The present was extraction efficiency of 3.91, 7.81, 125 and 1000 µg/mL (89.86, 80.90, 91.11 and 90.66%). Successful separation of the drug from the related substances and its internal standard (n-heptyl-4-hydroxy benzonate) were achieved on a Sunfire C18 column (150×4.6 mm, with a diameter of 5 µm) and detector of UV at 210 nm, 1.0 ml/min as a flow rate, and 20 µl as an injection volume. For the RP-HPLC method, acetonitrile-water-isopropyl alcohol (70:25:5, v/v/v) was used as mobile phase and the column temperature was 50°C. The method was validated in terms of linearity, precision, accuracy, and specificity. Accuracy satisfactory by % recovery obtained in the range of 89.93%-101.71%, the linearity results for KF506 in the specified concentration (2-1000 µg/mL) calibration curves was linear with a coefficient of variation 0.9999. In this study, we developed and validated a simple chromatographic method for quantitation of KF506 in ointment. The method was validated by following the analytical performance parameters suggested by the ICH guidelines.

PP-44

IN VIVO STUDY OF HEPATOPROTECTIVE, ANTI-INFLAMMATORY AND DIURETIC ACTIVITIES OF *FRAXINUS ANGUSTIFOLIA* AND *PISTACIA LENTISCUS* LEAVES EXTRACTS

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The biological activities of *Fraxinus angustifolia* (Oleaceae) and *Pistacia lentiscus* (Anacardiaceae) leaves extracts were investigated using animal models, in this study. Hepatoprotective assay was examined using carbon tetrachloride (CCl₄)-intoxicated mice as an experimental model. Microscopic observations indicated that pretreatment of mice with alpha-tocopherol (50 mg/kg) and leaves extracts of *F. angustifolia* and *P. lentiscus* (50 mg/kg) for 7 days offered significant protection against CCl₄-induced hepatic damage, compared to the control untreated group which showed major histological

changes. Anti-inflammatory activity of extracts solutions (200 mg/kg body weight) was evaluated by the carrageenan-induced mice hind paw edema method. The tested extracts produced significant inhibition through the duration of the experiment, 44.13% after 4 hours of treatment by *F. angustifolia* extract, similar to that of the reference drug, diclofenac. The evaluation of diuretic effect of plant extracts (200 mg plant extract/kg body weight) was carried out on normotensive male Wistar rats. A significant increase in urine output volume was observed in the first 8 hours following pre-treatment with *Pistacia lentiscus* extract, similar to the effect of furosemide. Moreover, sodium and potassium excretion consolidated this diuretic effect. The results plead for the use of *F. angustifolia* and *P. lentiscus* extracts as a source of bioactive compounds.

PP-45

BIODIVERSITY AND ETHNOBOTANY OF NATIONAL PARK BABOR NORTH EAST OF ALGERIA

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Herbal medicine is an art of cure. It shows a great development during many periods. A study on ethnobotany was led to an investigation with skilled and good informed traditional practitioners and local population of Babor National Park in order to know different uses of the local plants for medicinal purposes and their therapeutic properties.

PP-46

ANTIOXIDANT ACTIVITY AND ANTIBACTERIAL ACTIVITY OF AQUEOUS EXTRACT OF PROPOLIS FROM SÉTIF, ALGERIA

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Propolis, an extremely complex resinous material has been much popular as an agent in traditional medicine and food supplementary material for human health in the world. It exhibits valuable pharmacological and biological and antimicrobial activity. In this study, the antioxidant

and antibacterial activities of aqueous extract of propolis from Sétif were determined. The propolis was used as a powder after extraction with boiled water. Air-dried propolis (25 g) was ground into a fine powder and mixed with 400 mL boiling water by magnetic stirrer for 15 min. Then the aqueous extract was filtered over cheese-cloth and Whatman paper N°1, respectively. The filtrates were evaporated to dryness on a rotary evaporator under reduced pressure at 40°C and then freeze-dried. The antioxidant activity was evaluated using the technique of reduction of DPPH, and antibacterial activity was determined by the diffusion disc technique, using 10 µL of propolis aqueous extract diluted in DMSO on Whatman paper N°1 was applied into Muller Hinten medium inoculated by a bacterial suspension. The results showed that at 0.813 mg/mL the propolis gave a 50% of free radical-scavenging activity. At a concentration of 1.5 mg/ml of crude propolis inhibited the growth of *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Bacillus* sp. with inhibition zones of 8, 11 and 10 mm respectively.

PP-47
THE FOLK MEDICINAL PLANTS OF
YÜKSEKOVA (HAKKARİ/TURKEY)

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This study was made to reveal the plants used as traditional folk medicine in Yüksekova (Hakkari) situated in southeast of Turkey. The specimens of the plants used as folk remedies have been collected and the information about the local names, the part(s) used, the ailments treated, the therapeutic effect, the preparation, the methods of administration, and the duration of treatment has been recorded. The ethnopharmacological information was obtained from the local people by personal interviews carried out face to face. The plants specimens are kept in the Herbarium of the Faculty of Pharmacy, Marmara University. As a result of identification of the plant specimens, 25 species, used as a traditional folk medicine in Yüksekova, have been determined. Among them, 20 species are wild and 5 species are cultivated plants. According to the majority of the plants which have similar usage, the plants are mostly used for urinary system diseases, wound, diabetes, and stomach diseases.

PP-48
THE FOLK MEDICINAL PLANTS OF MURADIYE
AND ERÇEK (VAN/TURKEY)

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This study was made to reveal the plants used as traditional folk medicine in Muradiye and Erçek (Van) situated in east of Turkey. The specimens of the plants used as folk remedies have been collected and the information about the local names, the part(s) used, the ailments treated, the therapeutic effect, the preparation, the methods of administration, and the duration of treatment has been recorded. The ethnopharmacological information was obtained from the local people by personal interviews carried out face to face. The plants specimens are kept in the Herbarium of the Faculty of Pharmacy, Marmara University. As a result of identification of the plant specimens, 45 taxa, used as a traditional folk medicine in Muradiye and Erçek, have been determined. Among them, 43 species are wild and 2 species are cultivated plants. According to the majority of the plants which have similar usage, the plants are mostly used for stomach diseases, cold, asthma, gynecological diseases and cancer.

PP-49
INVESTIGATIONS ON THE EUROPEAN
PHARMACOPEIA CONFORMITY OF *CAPSICUM*
***ANNUUM* L. SAMPLES COLLECTED FROM**
TURKISH MARKET

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Red pepper, like almost every region of the world is widely consumed in our country and it has an important role in the economy of our country. However, there are some quality disturbances in the process of production of Red Pepper such as cultivation, drying, processing and storage. Additionally, many red pepper preparations are sold in to the market without proper scientific evaluation, and without mandatory safety and toxicological studies (especially for losing weight). The aim of this study is to determine if red pepper samples bought in the Kayseri market (such as herbalist, bazaar) are conform to *Capsicum annuum* L. monograph in the European Pharmacopoeia or not. For this purpose, morphologic and microscopic analyses, TLC analyses, foreign matters, lose on drying, total ash quantities have been assigned on 10 samples bought from the market, respectively.

PP-50

THE SPONTANEOUS FLORA OF VALLE CAUDINA HISTORICAL WALLS, PROVINCE OF BENEVENTO, CAMPANIA REGION (ITALY)

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The anthropization of Valle Caudina, an area of Sannio in the geographical center of Campania, keeps the marks of its long and complex history in the remains, nowadays converted into ruins. Prehistoric sites, Sannio walls, Roman remains, ruins of Lombard, Angevin and Aragonese fortifications, residues walls of religious buildings, palaces, farms and workshops, however, can rightfully be evaluated as part of the environmental heritage if you consider that over time have become a very special natural habitat in which a particular natural flora thrives.

PP-51

ETNO-BOTANICAL HISTORY, FORMS AND SYMBOLS OF SANNIO AREA BETWEEN SAMNITES AND LONGOBARDS, PROVINCE OF BENEVENTO, CAMPANIA REGION (ITALY)

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The communities of Valle Caudina, a predominantly agricultural territory since the beginning of its settlement, have maintained, in their collective imagination, the ancestral signs of their original cultural identity, formed especially along the groove of the main Sunni and Lombard colonization. The myths, the legends, and the signs of a specific culture in which it is rightly inserted also the famous "walnut tree of Benevento," can also be found in the many ethno-botanical symbolism of which, the local culture is rich.

PP-52

ETHNOBOTANICAL CHARACTERISTICS OF *CYCLAMEN* L. SPECIES GROWING IN TURKEY

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The aim of ethnobotany is to study how and why people use and conceptualize plants in their local environments. The most asked two questions are: how and in what ways people use nature, and how and in what ways people view nature. Ethnobotanists gather data mainly from living peoples in hopes of gathering a view of their past existence as well as an understanding of present uses of plants for food, medicine, construction materials, and tools. More than 500 geophyte species grow naturally in Turkey and the bulbs of the majority of these are exported. The genus *Cyclamen* L. (Myrsinaceae) comprises about 21 species, which are predominately distributed in the Mediterranean area especially Greece and Turkey. In Turkey, this genus is represented with 10 species, 4 of which are endemic. The species of this genus grow naturally in dry forest or scrub where they are at least partly shaded from intense sunlight. The flowers are white, pink, purple or carmine with scented or unscented flowers and leaves of many *Cyclamen* species are beautifully marked. Although they have been used as ornamentals for the last 400 years or so, *Cyclamen* have been used medicinally for over 2000 years. Some species belonging to this genus are used for their biological activities in folk medicine or used for their other features. In this study ethnobotanical uses of *Cyclamen* L. species growing in Turkey are reviewed.

PP-53

ETHNOMEDICINAL USES OF THE FAMILY LABIATAE (LAMIACEAE) IN SAVAŞTEPE (BALIKESİR)

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Uses of Ethnomedicinal plants of *Lamiacea* in Savaştepe (Balıkesir) Central Anatolia provinces have been studied. Uses of these plants have been reported. The field work was carried out in Savaştepe (Balıkesir) during 10 days. During the field studies, the plant specimens were collected together with accompanied informants. The collected fresh materials were numbered and kept as samples for botanical identification. Taxonomical determination of the collected specimen was made. The plants that collected with folk medicinal plant user were identified and prepared voucher specimens were kept in the Herbarium of Istanbul University. In this study, Uses of the medicinal plants of Lamiaceae family in Savaştepe (Balıkesir) will be listed. The uses of the medicinal plants will be compared with other Ethnobotanical studies in Balıkesir.

PP-54
PLANTS USED IN THE TREATMENT OF
HEMORRHOID IN BIGA/ÇANAKKALE
(TURKEY)

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Hemorrhoid is one of the most common anorectal diseases with inconvenient symptoms and has a high incidence. About 5% of the total population experience hemorrhoid once in their lifetimes. In addition, roughly 50% of the people in their 50's or older receive hemorrhoid treatments. When folk medicine researches were investigated up to now in our country, most frequently used traditional medicine was reported as for treatment of hemorrhoid among people. This result could be due to a reluctance of patients' to be examined the disease to the doctors. So people, who cannot go to the doctor easily, try to find solutions by herbal treatments. The plants which are used for the treatment of hemorrhoid are usually called as "Basur otu" and "Mayasıl otu" in Turkish. An ethnobotanical study was made between 2011 and 2013 in Biga district of Çanakkale in Turkey. In this study, the data about plants used in treatment of hemorrhoid obtained from interviews with local people during the field works are given. According to our results; *Arum* sp., *Centaurium erythraea* Rafn, *Ecballium elaterium* (L.) A. Rich, *Equisetum telmateia* Ehrh., *Heracleum sphondylium* L. subsp. *ternatum* (Velen.) Brummitt, *Juniperus oxycedrus* L. subsp. *oxycedrus*, *Ornithogalum montanum* Cirillo, *Tamus communis* L. subsp. *communis*, *Tribulus terrestris* L., *Verbascum densiflorum* Bertol., are used for the treatment of hemorrhoid in Biga.

PP-55
BIOLOGICAL ACTIVITIES OF *MUSCARI*
***NEGLECTUM* GROWING IN TURKEY**

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The genus *Muscari* (Hyacinthaceae) is represented by nearly 50 species on the Earth, those species widely spread in temperate Europe, the Mediterranean and Central Asia. In Turkey, 30 of them grow and are known as "sümbül, arap sümbülü, morbaş, misk soğanı, horozibiği, karga pabucu, dağ soğanı". Among them, *Muscari neglectum* have been used in traditional medicine as antirheumatic, stomachic, diuretic, expectorant and anti verruca. In addition to this, it has also been used as food for humans and animals, dye, toys, ornamental plants in parks and gardens. The chemical composition of the *M. neglectum* is composed of anthocyanins, flavonoids, homoisoflavanones, spirocyclic nortriterpenoid glycosides, polyhydroxylated pyrrolizidine alkaloids and essential oil. The aim of this study was to investigate the total phenolic content as well as the antioxidant, cytotoxic and antimicrobial activities of the several extracts obtained from herba and bulbs of *M. neglectum* collected from Kahramanmaraş, Turkey. The antioxidant capacities of the extracts were evaluated with DPPH radical scavenging activity, metal chelating capacity and ABTS radical cation scavenging capacity assays, including total phenolic content. The cytotoxic potentials of the extracts were determined by MTT assay on HeLa-cells (human cancer cell line) and NRK-52E-cells (rat kidney cell line). The crude several extracts of *M. neglectum* were analyzed using a microdilution assay for antimicrobial activity against several microorganisms.

PP-56
THE INHIBITORY EFFECT OF *BOEHMERIA*
***NIVEA* (L.) GAUDICH ON DSS-INDUCED COLITIS**
AND TPA-INDUCED EAR EDEMA

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The *Boehmeria nivea* (L.) Gaudich has been widely grown in Asian countries, and exerts many important biological activities. In this study, we first examined the effect of 70% ethanol extract of *Boehmeria nivea* (L.) Gaudich (EBN) on colitis in BALB/c mice. Colitis was induced by 3% dextran sodium sulfate (DSS) in drinking water. Oral administration of EBN (200, 250, and 500mg/kg) improved both disease activity index (DAI) and colon shortening induced by DSS. EBN also reduced the expression of Cyclooxygenase-2 (COX-2) induced by

DSS in colon tissue. Next we also examined whether EBN exerts an anti-inflammatory effect on TPA-induced ear edema. Administration of EBN (500mg/kg) significantly decreased TPA-induced mouse ear edema. EBN also decreased the production of pro-inflammatory cytokines such as TNF- α and MCP-1 elevated by TPA in serum. These results suggest that ethanol extract of *Boehmeria nivea* (L.) Gaudich (EBN) may be useful for preventing colitis and skin inflammation.

PP-57

ANTIOXIDANT, ANTIPROLIFERATIVE AND ANTIMICOTOXIGENIC ACTIVITY OF *Citrullus colocynthis* L. Schrader ORGANIC EXTRACTS

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Citrullus colocynthis L. Schrader is an annual plant, belonging to the *Cucurbitaceae* family, which grows in arid and semi-arid regions. Native to tropical Asia and Africa is also widely distributed in the desert areas of the Mediterranean basin. Many pharmacological properties (anti-inflammatory, anti-diabetic, analgesic and anti-epileptic) are ascribed to different organs of this plant; extracts and derivatives of *C. colocynthis* are used in folk Berber medicine for the treatment of numerous diseases from rheumatism arthritis, hypertension bronchitis, from mastitis and, even, to cancer. We developed a combined approach aimed at investigating biological activities of leaf and root organic extracts, including: i) classic antioxidant activity *in vitro* tests (DPPH assay; Reducing power determination; β -Carotene/linoleic acid bleaching assay); ii) antiproliferative and antioxidant evaluation on the human colon adenocarcinoma cell line HT29; iii) high-throughput fluorescence-based procedure to determinate the inhibitory effect on aflatoxin production and spores germination in *Aspergillus flavus*. Extracts showed a high antioxidant capacity *in vitro*. Regarding

the human cell line HT29, the greater antiproliferative activity was observed with the leaf chloroform extract (IC₅₀=160 μ g/ml), that also proved to be capable of significantly reducing the oxidative damage to DNA induced by hydrogen peroxide. This antioxidant activity is similar to that obtained with ascorbic acid 1 mM. Furthermore, the results achieved showed that some extract were able to interfere with aflatoxin metabolism in *A. flavus*, that can be used as a model system to detect the antioxidant potential of compounds (either pure or in mixture) or plant complex extracts.

PP-58

OLIVE OILS FROM ALGERIA: PHENOLIC COMPOUNDS COMPOSITION AND ANTIOXIDANT ACTIVITY

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Phenolic compounds present in olive oil have received much attention in recent years due to their beneficial functional and nutritional effects. In addition to extending the shelf life of foods by inhibition of lipid peroxydation, the phenolic act in the scavenging of free radicals and can protect the human body against damage caused by them. Phenolic compositions, antioxidant activity of phenolic extracts of olive oil varieties from Algeria, were investigated. The analysis of polyphenols was performed by Folin-Ciocalteu colorimetric method HPLC. The antioxidant activity was assessed by the scavenging effect on the DPPH and ABTS⁺radicals. The results showed many phenolic compounds were identified and quantified by using HPLC. Derivatives of oleuropein, and ligstroside, hydroxytyrosol, tyrosol, flavonoids, and lignans reporting unique and characteristic phenolic profile. These phenolic fractions also differentiate the total antioxidant activity. The total phenol was significantly ($p < 0.05$) correlated with DPPH ($r=0.72$) and ABTS⁺radicals ($r=0.76$). The results obtained denote that Algerian olive oils may constitute a good source of healthy compounds, phenolics compounds, in the diet, suggesting that their consumption could be useful in the prevention of diseases in which free radicals are implicated

PP-59
CHEMOPROTECTIVE EFFECT OF SPINACH PLANT (CHENOPODIACEAE) EXTRACTS

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Spinach (*Spinacia oleracea* L.) possesses a variety of metabolites with biological functions, including antitumor and chemoprotective activity, but little is known about the modulation of this secondary metabolite induction by abiotic stress (i.e. hypoxia), and its correlation to human health. By means of HPLC/MS analysis, we demonstrated that 24h low oxygen stress can modify the balance of the secondary metabolites presence in spinach. By Comet Assay and Luminescent Cell Viability Assay, we showed that different spinach aqueous extracts and fresh spinach juices have different antioxidant and antiproliferative activities on human colon adenocarcinoma HT-29 cell line, depending on the concentration of antioxidants in each extract. A relationship among different concentrations of antioxidant molecules present in each extract and biological activities on cells was stated. When the antioxidant content increases over a defined threshold, the overall antioxidant activity is reduced or lost, probably due to a prooxidant activity of such molecules in the biological system. In conclusion, spinach provides a valuable contribution to the field of chemoprevention and prevention of chronic degenerative diseases thanks to its antioxidant and antiproliferative properties.

PP-60
CHANGES OF QUALITY CHARACTERISTICS OF NETTLE (*URTICA DIOICA* L.) WITH HOT AIR DRYING

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Nettle is usually considered to be an invasive and unpleasant weed, very common in many parts of Europe and in the temperate zones of Asia and America. It has in the past been used both as a food, since the leaves are rich

in protein. Nettle is nutritionally high in vitamins A, C and D, also minerals iron, manganese, potassium and calcium. The plants are used principally in pottage; a tea made from the leaves has traditionally been used. In addition of its nutritional properties, it is important for pharmacy. The leaf has been used to treat alopecia, eczema, gout, urticaria, allergic rhinitis, and rheumatoid arthritis, while the root is used to treat benign prostatic hypertrophy. In this research, effect of hot-air drying behaviour of nettle (*Urtica dioica* L.) and changing of quality characteristics were determined at three different temperatures (30°C, 40°C, 50°C) at 2 m/s drying air velocity at 20 % air relative humidity for the samples of nettle leaves (120 g) and at two different temperatures (30 °C, 50 °C) at 2 m/s drying air velocity at 20 % air relative humidity for the samples of nettle stems (150 g). For this aim a cabin type laboratory drier was used. As a quality characteristics color changes and minerals (calcium, potassium and magnesium) were investigated. Potassium varied between 1.18 and 1.85 % whereas calcium varied between 0.98 and 1.50 %. Magnesium percentage was determined 0.24-0.37 % in stem. Calcium amount were determined leaf more than in stem. The results have shown that, increasing the drying air temperature and velocity causes shorter drying times. While the increasing drying air temperature decreased the colour lightness, increasing drying air velocity raised it. At 30 °C were measured most colour lightness (L) and redness (a) and yellowness (b) in leaf and stem material.

PP-61
THE IMPORTANCE AND THE USAGE OF *TEUCRIUM POLIUM* L. IN BALIKESIR PROVINCE

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Teucrium polium L. belonging to the Lamiaceae family is a perennial herbaceous plant and commonly known as Kısa Mahmut in Turkey. Flowers are whitish. In terms of the shape of flowers, *T. polium* and *T. montanum* L. are different from other members of *Teucrium* L. genus. It is represented by one species in Turkey but its specimens have some varieties in morphologically. Dried flowers, leaves and branches of this plant are consumed as spices and can also be used as urine remover, body strengthening, sweat derailer, wound healer and menstrual cycle regulator. Furthermore, this plant stimulates appetite, gall bladder, kidneys and helps in digestion but it is mainly used against stomach ailments and also famous as treatment of ulcers of the stomach and duodenum in some countries. In this study, some various

questions were asked to the people living in Balıkesir province and surrounding area about *T. polium* and prevalence of use, local names in Balıkesir region and why and how it is using in this area were determined. As a result of study, *T. polium* grows naturally in Balıkesir and it is used as spice, black tea against gastrointestinal diseases, diabetes and also used against some other diseases such as rheumatism, prostate, haemorrhoids. And also, “mide otu”, “kır yavşanı”, “yevşen”, “yavşan”, “acı yavşan”, “mayasıl otu”, “bodur mahmut”, “kısa mahmut”, “tüylü kısa mahmut” have been using as local names in Balıkesir.

PP-62
THE FOLK MEDICINAL PLANTS OF NİZİP
(GAZİANTEP-TURKEY)

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This study was made to reveal the plants used as traditional folk medicine in Nizip (Gaziantep) located in the southeastern part of Turkey. The specimens of the plants used as folk remedies have been collected and the information about the local names, the part(s) used, the ailments treated, the therapeutic effect, the preparation, the methods of administration, and the duration of treatment has been recorded. The ethnopharmacological information was obtained from the local people by personal interviews carried out face to face. The plant specimens are kept in the Herbarium of the Faculty of Pharmacy, Marmara University. As a result of identification of the plant specimens, 26 species, used as a traditional folk medicine in Nizip, have been determined. Among them, 22 species are wild and 4 species are cultivated plants. According to the majority of the plants which have similar usage, the plants are mostly used for gastrointestinal disorders, diabetes, cold, and kidney ailments.

PP-63
THE FOLK MEDICINAL PLANTS OF BATMAN
(TURKEY)

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This study was made to reveal the plants used as traditional folk medicine in Batman located in the southeastern part of Turkey. The specimens of the plants used as folk remedies have been collected and the information about the local

names, the part(s) used, the ailments treated, the therapeutic effect, the preparation, the methods of administration, and the duration of treatment has been recorded. The ethnopharmacological information was obtained from the local people by personal interviews carried out face to face. The plants specimens are kept in the Herbarium of the Faculty of Pharmacy, Marmara University. As a result of identification of the plant specimens, 31 species, used as a traditional folk medicine in Batman, have been determined. Among them, 26 species are wild and 5 species are cultivated plants. According to the majority of the plants which have similar usage, the plants are mostly used for gastrointestinal disorders, cold, antitussive, diabetes and urinary system diseases.

PP-64
ANTIOXIDANT PROPERTIES OF *CENTAUREA*
***URVILLEI* DC. SUBSP. *STEPPOSA* WAGENTZ**

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The members of *Centaurea* have been used for treatment of several ailments in traditional Anatolian medicine. Antioxidant capacity of methanolic extract obtained from *Centaurea urvillei* subsp. *stepposa* was investigated using different chemical assays including phosphomolybdenum, DPPH, ferric and cupric reducing power assay. Moreover, total phenolic and flavonoid content in this extract was calculated. Antioxidant capacity was expressed as trolox equivalents (mgTEs/g). Total phenolic and flavonoid content were found to be 33.11 mg GAE/g extract and 24.64 mg RE/g extract, respectively. Free radical scavenging activity in DPPH assay was noted as 43.35 mgTEs/g extract. Antioxidant activity was determined as 335.98 mgTEs/g extract in phosphomolybdenum assay. Reducing power activities were 52.18 mgTEs/g extract in FRAP assay and 98.78 mgTEs/g extract in CUPRAC assay. These findings suggest that this species could serve as an important natural resource of antioxidants for using in the some industries, including food, pharmacology and cosmetics.

PP-65

FATTY ACID COMPOSITION OF *CENTAUREA DRABIFOLIA* SM. SUBSP. *DETONSA* (BORNM.) WAGENITZ

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The genus *Centaurea* has been used for different purposes in Traditional Anatolian Medicine. Fatty acid composition of oil extracted from *Centaurea drabifolia* subsp. *detonsa* collected from Central Anatolia region of Turkey was investigated. Thirty fatty acids were identified in the oils using GC technique. In this oil, α -linolenic (C 18:2 ω 3), linoleic (C 18:2 ω 6) and palmitic (C 16:0) acid were determined to be dominant fatty acids. This fatty acid content was 34.22%, 20.60% and 18.12%, respectively. Total polyunsaturated fatty acids (PUFA) were the most abundant fatty acids. These fatty acids accounted for 67.05% of total fatty acids. Total polyunsaturated fatty acids content was higher than saturated (28.81%) and monounsaturated fatty acids (4.15%) in the oil. The results of the present study suggested that this species may be considered as a source of unsaturated fatty acids in food, cosmetics and pharmacological industry.

PP-66

ACETYLCHOLINESTERASE (ACHE) INHIBITORY AND ANTI-INFLAMMATORY ACTIVITIES OF METHANOLIC EXTRACTS FROM *CENTAUREA ANTIOCHIA* VAR. *PRAEALTA* AND *CENTAUREA NERIMANIAE*

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Centaurea L. (Asteraceae) is one of the richest genera in Flora of Turkey. It is represented by 34 sections and 210 species of which 64 % are endemic. *Centaurea antiochia* Boiss. var. *praealta* (Boiss. & Bal.) Wagenitz and *Centaurea nerimaniae* Ş. Kültür, are endemic species

which situated in the South Anatolia of Turkey. In this study, the acetylcholinesterase (AChE) inhibitory and anti-inflammatory activities of methanolic extracts from *Centaurea antiochia* var. *praealta* and *Centaurea nerimaniae*. AChE inhibitory activities of methanolic extracts were tested using Ellman's colorimetric method in 96-welled microplates. All the extracts showed the AChE inhibitory activity below 50% at 5 mg/ml. Anti-inflammatory activities of methanolic extracts were evaluated against cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2), key enzymes relating to inflammation. The ability of the extracts to inhibit cyclooxygenase enzymes was determined by calculating percent inhibition of PGE2 production measured by enzyme immunoassay. The results showed considerable inhibitory activities (up to 80 % at final concentration of 87 μ g/ml) of extracts against COX-1 and COX-2, suggesting that these species might be a potential source of effective plant-derived anti-inflammatory substances. These findings may provide a pharmacological explanation for some of uses of these species in Turkish folk medicine like anti-inflammatory and wound healing agents.

PP-67

INVESTIGATION OF STEM ANATOMY OF HEPTAPTERA SPECIES GROWING IN TURKEY

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Many plants grow naturally in our country belonging to the family Apiaceae (Umbelliferae) that are used as folk medicine. Heptaptera genus, featuring general characteristics of the Apiaceae family, is very similar to the genus *Prangos* and *Hippomaratum*. Though *Prangos* and *Hippomaratum* genera have documented ethnobotanical usages in Turkey and throughout the world, no traditional use of the genus Heptaptera genus has been reported up to date. In this study, 4 Heptaptera species growing in Turkey were examined and their differences in respect to stem anatomies were revealed. Their usages as folk medicines were also compared with the usages of closely related taxa.

PP-68

THE DETERMINATION OF THE ELLAGIC ACID AFTER THE HYDROLYSIS IN CHESTNUT PEEL AND PERICARP BY HPLC-DAD

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The amount of a polyphenol, ellagic acid (EA) exists in the chestnut peel and pericarp was investigated quantitatively after the acid hydrolysis. Polyphenols are important chemicals because of their sensorial properties like bitterness, colorfulness and the effects on health. Ellagitannins are the molecules which likely exist in chestnut peel and expected forming the ellagic acid via the hydrolysis, have one or more hegzahidroksidifenol groups of sugar esters. Upon ellagitannins were treated with acids or bases in certain conditions the ester links hydrolyse to hegzahidroksidifenic acid and glucose and then forms the ellagic acid via lactonising of hegzahidroksidifenic acid itself. The chestnut peel and pericarp dried, grinded and sieved to have a homogenized mixture in the present study. The equal portions were taken from this sample and extracted by Accelerated Solvent Extractor (ASE 100) with 100% methanol in three cycles. The 3 portions were studied as the 2 parallel samples. Methanol evaporated and then hydrolyzed with 4N trifluoro acetic acid at 110⁰C in 2 hour and 30 min. The enhancement of the ellagic acid after the hydrolysis reaction was investigated by the currently developed RP-HPLC-DAD method. Chromatographic conditions: Column: ODS V3; mobile phase: % 825 mM, pH=2.5 KHPO₄ solution, % 18 acetonitrile, EA retention time: 10.52 min, analysis time: 28.0 min, pressure: 135 bar, temperature: 25.0⁰C. The HPLC-DAD analysis results show that before and after and hydrolysis reaction, the peak area of the ellagic acid was 4.34 times more. The peak areas of the 2 unknown substances which were probably ellagitannins ($r_{tX1} = 2.49$ min $r_{tX2} = 3.28$ min) diminished. The calibration curve was constructed by the standard addition method. The calibration curve was found as $y = 189,904x + 1,101$ and $r^2 = 0.9990$. The recovery was 71 %. The hydrolysis conditions were optimized in respect to temperature, time and the acid amount. The future studies will be the validation of the HPLC-DAD method and the comparisons of the vescalagin and castalagin (ellagitannins) standard substances in chestnut peel ($r_{tX1} = 2.49$ min $r_{tX2} = 3.28$ min) with the studied matrix of this research.

PP-69

SOLID-PHASE MICROEXTRACTION AND GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS OF FOUR *ORNITHOGALUM* SPECIES FROM TURKEY

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The genus *Ornithogalum* (Liliaceae) includes about 150 species distributed in temperate regions of Europe, Asia and Africa and recorded by 34 species in Turkish flora. The bulbs of the plant which has medical and economic value are used as emetic and against abscess since the time of Dioscorides. Moreover, *O. sigmoideum* bulbs are consumed as food and sold in local markets. In this study, a solid phase microextraction (SPME) method with gas chromatography-mass spectrometry (GC/MS) was used for analysis of the volatile compounds in flowers and bulbs of four *Ornithogalum* species. The samples of flowers and bulbs of *O. sigmoideum*, *O. orthophyllum*, *O. umbellatum*, *O. oligophyllum* were separately analyzed by SPME-GC-MS. A comparison of volatile compounds was made between species and the parts studied. In distinct parts of the species different volatile compounds were determined. The major volatile organic compound of the flowers of four species was nonanal (17.4%, 18.8%, 23.6% and 19.2% respectively). Analyses revealed that SPME-GC-MS method is appropriate for the analysis of volatile compounds of *Ornithogalum* species.

PP-70

ETHNOBOTANICAL PROPERTIES OF SOME *ONOPORDUM* L. SPECIES FROM TURKEY

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As is the case elsewhere in the world, Turkish people have long utilized plants as remedies, food, fuel, and dye, as well as for furniture, ornamentation, agricultural tools, and construction materials. Ethnobotanical studies have been carried out in Turkey since the early years of the 19th century. Medicinal plants are valuable natural resources that recently have interested in developed countries and are considered as primary material to turn to drugs well thought-out safe for humans. *Onopordum* is a

valuable medicinal plant that is widely used in traditional medicine in Europe. The application of *Onopordum* as food is limited and its main importance is due to medicine utilization. Because of having flavonoid compositions, *Onopordum* is an important plant. The Genus *Onopordum* L. (Asteraceae) includes about 38 species. The representatives of the genus are native to Europe, Northern Africa, the Canary Island, the Caucasus, Southwest and Central Asia. They grow on disturbed land, roadsides, arable land and pastures. In Turkey, this genus is represented with 19 species, 5 of which are endemic. *Onopordum* (cotton thistle, also known as Scots or Scotch thistle) species are biennials herbaceous plants with branched, spinose winged stems, growing 0.5-3 m tall. They have application in medical practice as a bactericide, cardiogenic, and hemostatic agent and are used against hypotonicity. *Onopordum* species are also used as food plants by the larvae of some Lepidoptera species. In the study ethnobotanical properties of *Onopordum* L. species growing in Turkey are reviewed.

PP-71 THE ETHNOBOTANICAL IMPORTANCE OF *SAMBUCUS NIGRA* L.

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This paper reviews the ethnobotanical uses, chemical and pharmacological studies on *Sambucus nigra* L. (Caprifoliaceae). *Sambucus nigra* known as ‘black elder’, ‘Mürver’ in Turkish has been used for centuries in Europe, northern Africa and some parts of Asia. It is widely used as wine, jam, juice, herbal tea in the food industry. It is also an ingredient of food supplements (syrup, extracts, lozenges etc.). The elder flower extract standardized on flavonoids expressed as isoquercitroside is recorded in European and British Pharmacopoeias. European Medicines Agency (EMA) has published detailed assessment report on Sambuci Fructus. In folk medicine, elderberries have been used for diaphoretic, laxative, diuretic properties and also to treat some illness such as common cold, rheumatism, constipation. The flowers have diaphoretic, antitarrhal, expectorant, diuretic and antiinflammatory effects. Leaves and inner bark are also used for various diseases. The paper will critically review the literature data based on the recent scientific facts.

PP-72 ESSENTIAL OILS COMPOSITION OF *BUNIUM* SPECIES FROM ALGERIA

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The essential oils obtained by hydrodistillation of dried aerial parts of *Bunium incrassatum* from west Setif (Timellouka) and *Bunium alpinum* from North Setif (Megress mountain at 1500 m) were analyzed by GC and GC/MS. The essential oil yield based on dried plant material was 0.10% for both of them. Thirty one compounds (corresponding to 97.19% of the total weight) were identified for *Bunium incrassatum*. The main component was palmitic acid (18.39%). While twenty four compounds (corresponding to 87.33% of the total weight) were identified for *Bunium alpinum*, the main component was caryophyllene oxide (33.84%).

PP-73 COMPONENTS OF *QUERCUS MONGOLICA* F. AND *QUERCUS VARIABILIS* B. ACORNS FOR FOOD SOURCE

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Acorn powder is a valuable source for Korean traditional food called ‘mook [muk]’. *Q. mongolica* (QM) flowers and produces acorns in the same year, while *Q. variabilis* (QV) takes 2 years from flowering to fruition. Such physiological differences may lead to the differences in seed components. Also most analyses of acorn powder were reported without clear distinction of species. Acorns from 10 families in both species were used for the analyses. Seed coats were removed, and then ground to get powder. Moisture was

higher in QV than in QM. Crude fat content was 2.5% in QV, 2.5 times higher than that in QM. In ash, crude protein and carbohydrate, contents were a little bit higher in QM than in QV. Difference among families in both species was 7% for moisture; 0.4% for ash; and 6% for carbohydrate, etc. The highest content in crude protein was double the lowest among QM families, and the former in crude fat was 2.5 times the latter among QV families. In minerals, the highest content in two species was P, K, Na, in order. Ca > Mg was in QM, while Mg > Ca in QV. P content in QV was ca 2 times higher than in QM, while Ca content was ca 2 times higher in QM than in QV. The mineral content (mg/100g) was for QM and QV in: Zn 0.52 & 0.49; Cu 0.30 & 0.23; Na 62.94 & 60.34; Pb 0.11 & 0.09; Ca 49.68 & 27.19; 0.82 & 2.18; Mg 40.54 & 44.75; Mn 2.57 & 3.89; K 189.55 & 208.10; and P 309.94 & 686.20, respectively. Glucose occupied more than 85% among component sugars in both species, and then galactose, arabinose, mannose, rhamnose, and ribose, in order of amount. Fucose and xylose were not detected in two species, while allose in QV only. Content of ribose, arbinose, mannose and galactose was similar on average in both species. Rhamnose was found ca 3 times higher in QM than in QV. In glucose content, QV (18.59 g/100g) has 2 g more than QM and there is a big difference among families in two species. **This study was carried out with the financial support of 'Forest Science & Technology Projects' of Korea Forest Service (Project No. S211013L020130) to the corresponding author.

PP-74

THE TRADITIONAL KNOWLEDGE SURVEY OF PLANTS IN SEVERAL INTERIOR VILLAGES IN THE REPUBLIC OF KOREA

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Investigating traditional usage of plants in remote, rural villages can provide a lot of valuable information for the development of various modern foods, medicines, and cosmetics. Although it is not clearly defined scientifically and/or technologically, this kind is called as local knowledge, traditional knowledge (TEK), indigenous knowledge (IK), sustainable knowledge, folk knowledge, culture knowledge, etc. The processing of such plants is to be associated with industry, culture, arts, sciences, etc. at the contemporary time. In this study documentation of traditional knowledge was carried out on mountain-grown plants through the interviews of local people in several villages in the mountain region, Republic of Korea to

propose the large scale study on traditional use of wild plants. The counties surveyed in Gangwon-do and Kyeongsangbuk-do, Republic of Korea, are located in the mid-eastern part in Korean Peninsula. Among a total of 254 pieces of traditional knowledge collected, 107 were utilization of plants for medicinal purposes; 96 for food; etc. Some of the plants were employed for rural people's life differently both in purpose and method and among localities. Medicinal plants were used to relieve or cure the pains such as cold, fever, joint problem, body injury, stomach disease, woman's disease, etc. The most popular part of a plant was leaf, stem, and timber in order. But a lot of people did not like to attend interviews, and more surveys are necessary to get valuable, useful traditional knowledge. **This study was carried out with the financial support of 'Forest Science & Technology Projects' of Korea Forest Service (Project No. S211013L020130) to the corresponding author.

PP-75

EVALUATION OF ANTIOXIDANT ACTIVITY OF EXTRACTS FROM *PLANTAGO ALBICANS* L.

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Plantago albicans L. is a medicinal plant from of the Plantaginaceae family known for its therapeutic properties in many ethnopharmacological applications. In this study, our objective is to investigate the antioxidant activity by the means of two methods: the FRAP (Ferric Reducing Antioxidant Power) method and DPPH of the extracts (DeeF, EaF, n-butanol and AqF) from the aerial parts of *Plantago albicans* L. The quantitative analyses are showed that the highest content of total flavonoids compounds were concentrated in the ethyl acetate (EaF) extract with $29.357 \pm 6.997 \mu\text{g}$. Tamarixetine equivalent/mg of extracts, in the second level the diethylether (DeeF) extract and n-butanol extract with $26.68 \pm 1.02 \mu\text{g}$ EAG/mg of extracts and $7.599 \pm 1.654 \mu\text{g}$ EAG/mg of extracts respectively. The evaluation of the scavenging capacity of the extracts with respect to DPPH shows that the diethylether (DeeF), ethyl acetate (EaF) and the n-butanol extracts were the most active, with an IC_{50} of 8.3, 1.6 and $1.2 \mu\text{g/mL}$, respectively. In ferric reducing power assay, the results showed that the extracts have a reducing power, and the highest power were recorded for the n-butanol ($TEAC_{FRAP} = 0.85-1.05$).

PP-76

ETNOLICHENOLOGY OF OLD MENS BEARD (*USNEA* SPP) at PRIANGAN, WEST JAVA, INDONESIA

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Usnea has been used for a long time in Indonesia for traditional medicine and crude material for jamu. There is limited information about study of taxonomy and local knowledge at Priangan. The research was conducted on March 2011 to April 2012. The aim of this research was explore the local knowledge of species *Usnea* conducted by emic and ethic approaches. The specimens were done by survey long the pine forest at Bandung, Sumedang, Garut, Ciamis and Tasikmalaya in Priangan areas. The specimens were analysis morphological, anatomy and chemical. The etnolichenoology study was done by descriptive qualitative, survey and interview also observation participative at Gunung Gelap Village and Kamojang area of Garut Regency and Cibunar village, Sumedang Regency in West Java. The interview was done with key informants. The taxonomic study found the 11 species of Beard lichens found in pine forest at Priangan, belong to 3 sub-genus, i.e. sub-genus *Dilichousnea*, consist of *Usnea filipendula*, *U. hirta*, *U. longisima* and *U. trichodea*. Sub-genus *Eumitra* consist of *U. baileyi* and *U. ceratina*. Sub-genus *Usnea* consists of *U. cornuta*, *U. flexilis*, *U. flexuosa*, *U. florida* and *U. glabra*. The dominant species growing on pine in different location are *U. baileyi* and *U. flexilis*. *Usnea* has thallus colour dark green, yellow-green, pale green and reddish brown. Thallus branching is dichotomous in all species with difference in the thickness form the isotomic or anisotomic dichotomous. Species *Usnea* is fructose with habits erect or subpendent or pendent. The lichens acid contain in *Usnea* species are different and dominant by usnic acid and protocetoric acid. The stictic acid was found in *U. flexuosa*. The result of interview has been known that *Usnea* was called *janggot kai* by the Sundanese. Inhabitants grouping the *Usnea* based on color, growth pattern and surface of thallus, known “*Janggot kai hejo*, *janggot kai koneng*, *janggot kai rubak*, *janggot kai ngaruntuy*, *janggot kai kesrak* and *janggot kai lemes*”. Inhabitants used *Usnea* as *raru* for preservative *nira*, medicine and spices. The Sudanese used *Usnea* in formula jamu or ubar kampong to treat ulcer in the mouth, dysentery, catch a cold, skin eruption, stiff, menstruation painful, hemorrhoids, child birth ease and in making

mahinum (jamu for mother after utter) and used as face powder of noble woman.

PP-77

EFFECTS OF STAR APPLE FRUIT (*CHRYSOPHYLLUM ALBIDUM*) CRUDE EXTRACTS ON CLINICAL MICROORGANISMS

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Star apple fruit (*Chrysophyllum albidum*) of a family *Sapotaceae* from a seasonal (December-March) tropical rainforest tree and majorly consumed for its palatable taste as food. The fruit was dried, pulverized and extracted with crude aqueous, ethanolic extracts as well as oil from the seeds. Aim was to investigate a more effective antimicrobial plant that can inhibit resistant strains, since antibiotics resistance is on the increase. Agar well diffusion technique sensitivity test was used to screen for their antimicrobial activities. The results revealed 25% resistance to ciprofloxacin of the tested bacteria (*P. aeruginosa*, *E. coli*, *S. aureus*, *S. faecalis* (*E. faecalis*), *S. typhi*, *K. pneumonia*, *B. subtilis* and *S. epidermidis*) but 100% susceptibility to the fruit aqueous and ethanolic crude extract. There was 100% bactericidal activity at 32mg/ml (aqueous extract) and 64mg/ml (ethanolic extract). *S. faecalis* had highest inhibition zone (29.00±0.58mm) at 800mg/ml (aqueous extract) and the least *B. subtilis* and *S. epidermidis* (0.0±0.0mm) at 200mg/ml and 800mg/ml (ethanolic extract). Seed Oil inhibited 25% (*S. epidermidis* and *S. aureus*). Five fungi (*A. flavus*, *A. niger*, *Penicillium spp*, *A. fumigatus* and *C. albican*) tested with the extracts showed 20% inhibition of *C. albican* by the fruit extract. Aqueous crude extracts were more efficient than the ethanolic extracts in the tested organisms and at all concentrations.

PP-78

ANTHRAQUINONES IN THE INVASIVE GIANT KNOTWEEDS (*FALLOPIA SP.*-POLYGONACEAE) FROM POLAND

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The Giant knot weeds *Fallopia* (syn. *Reynoutria*) *japonica* (Houtt.) Ronse Decr., *Fallopia sachalinensis* (F.Schmidt)

Ronse Decr. oraz *Fallopia x bohemica* *Fallopia* × *bohemica* (Chrtek & Chrtková) J. P. Bailey are among the most noxious invasive plants in Europe and North America. Japanese and Sachalin knotweed (previously known under respective binomials-*Polygonum cuspidatum* and *P. sachalinense*) origin in East Asia, where their rhizomes, (particularly of *F. japonica*) were used in phytotherapy under the names: *Polygoni cuspidati rhizoma*, Hu zhang (Chinese) orkojyō (Japanese). Their traditional usage in TCM or Kampo was against inflammatory diseases, diarrhoea, mycoses, gonorrhoea, etc. These plants were introduced to Europe as ornamentals and botanical curiosity during 19th century. At present, these enormous perennials are to find almost all over the Northern Hemisphere in temperate regions, where they overrun river banks, abandoned fields, and roadsides and railway areas. The two indigenous East Asian species have produced interspecific hybrids in Central Europe, that have been describe as a third species, Bohemian knotweed (*Fallopia x bohemica*), that is still relatively variable, depending on the relationships between maternal and paternal genetic background of parent species. Despite being noxious weeds, the plants' valuable constituents may be of additional benefit as source of herbal medicinal preparations. In our project, we aim at using the excessive biomass of these plants for obtaining, isolation, and bioactivity evaluation of phytochemicals from various organs of Giant knotweeds. In this paper, we focus on one of the predominant groups of bioactive metabolites-anthraquinones (AQs), their extraction, isolation, and purification, followed by evaluation of their contribution to the antioxidant and allelopathic properties of the herbs. The rhizomes collected in natural habitats in Southwestern Poland were extracted with methanol and the crude extract was re-extracted with dichloromethane. The DCM fraction was separated using silica gel column under gradient elution. The extracts and fractions were monitored with HPLC, and the identification of AQs was performed with LC-ESI-MS-MS. We have identified several known compounds such as emodin, physcione, rhein, citreorosein, that were subsequently isolated. Quantitative analysis confirmed the highest content of anthraquinones in *F. japonica*, followed by the hybrid *F. x bohemica*, while *F. sachalinensis* had the lowest AQ content (Acknowledgement: the study is being supported by a National Research Center of Poland Grant (program OPUS2) number NZ9/04763).

PP-79
GINSENOSIDES FROM KOREAN RED GINSENG INHIBIT MATRIX METALLOPROTEINASE-13 EXPRESSION

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Among mammalian matrix metalloproteinases (MMPs), MMPs-1, 3, 13 are collagenases to hydrolyze collagen materials. Particularly, MMP-13 is important to degrade major collagens in cartilage under some pathological conditions such as osteoarthritis. To establish a therapeutic potential against cartilage degradation disorders, 11 ginsenosides including ginsenosides Rb1, Rb2, Rc, Rd, Re, Rf, F4, Rg1, Rg3, Rg5 and Rk1 were isolated from the extracts of Korean red ginseng using counter current column chromatography. The effects of these ginsenosides on MMP-13 induction were examined in the human chondrocyte cell line, SW1353. When the ginsenosides were added to the IL-1 β -treated SW1353 cells and Western blotting was carried out, several ginsenosides such as Rc, Rd, Rf, F4, Rg3 and Rk1 were found to inhibit MMP-13 expression under non-cytotoxic concentrations at different concentration ranges of 1-50 μ M. The most prominent inhibitors are ginsenosides F4 and Rg3. Generally, the diol-type ginsenosides showed higher inhibitory action compared to the triol-type ginsenosides. Thus, it is suggested that some ginsenosides have therapeutic potential for protecting cartilage collagen matrix breakdown in the aging process and/or in the diseased tissues such as arthritic disorders.

PP-80
STRATEGY FOR CONSERVATION, RESTORATION, AND UTILIZATION OF RARE AND ENDANGERED PLANTS-A CASE OF COOPERATIVE PROJECT FOR WILD KOREAN GINSENG (*PANAX GINSENG* C. A. MEYER)

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Panax ginseng C. A. Meyer is distributed from Korean Peninsula through Northeast China to Russia Far East. Ginsenosides of ginseng are observed to help pharmacological actions including immune system modulation, anti-stress activities, anticancer effects, etc. Wild ginseng has long been accepted as high medicinal values, very rarely found in nature due to reckless harvest,

and thought to be close to extinction, in Korea. Many rare and endangered species are faced with extinction like Korean wild ginseng on account of over-exploration and climate change. Thus, it is very urgent to develop guidelines and establish strategies for conservation, restoration, and utilization of such plants like Korean wild ginseng. Forest Ginseng R&D Center (FGRDC) of Kangwon National University introduced strategies and methods for such activities for wild ginseng. Each municipal government is responsible for wild ginseng collection and conservation of orchard establishment and FGRDC establish the conservation orchard and perform research activates, propagate and develop the utilization method of wild ginseng for medicine, food and etc. Financial support and provision of genetic resources from those governments are critical for FGRDC. The progeny of wild ginsengs are given to FGRDC as propagation materials, the final products from FGRDC will be provided to government for restoration of natural habitat and commercial use. Korea Forest Service (KFS) was proposed to support financially FGRDC and obtain a lot of information for regulations and policies, and to control the unrevealed trade of wild ginsengs and to rehabilitate those. Techniques of FGRDC include propagation methods focused on artificial pollination and tissue culture, morphological and molecular genetic diversity analysis, cryopreservation of germ plasm, and chemical component analysis. Active cooperation of food or medicine companies is encouraged for successful works of FGRDC. A collaborative network is also necessary among East Asian countries which own wild rare and endangered plant genetic resources, i.e., *Panax ginseng*, etc. **Financial supports were given to the senior author for this study by the Municipal Government of Inje-gun, Gangwon-do, Republic of Korea and the Ministry of Education, China (Project No. MS2012DBLY017).

PP-81
TRADITIONAL ARBOR TEA PLANTATION IN NATURAL FOREST OF BULANG PEOPLE IN LANCANG-MEIKONG RIVER BASIN, YUNNAN PROVINCE, CHINA

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Yunnan Province is one of the most important tea production areas in China and is well known for its large repository of tea germplasm and rich diversity of tea

plants. The Bulang people and other ethnic groups have developed a traditional system to cultivate arbor tea under natural forests. The tea variety is *Camellia sinensis* var. *assamica*. Arbor tea plantation encompasses unique agroforestry and production systems, including cultural, religious, ethical, ecological and environmental concepts. A notable characteristic of these traditional plantations is its biodiversity richness, especially the genetic and landscape diversity of plant and animal resources. The tea variety cultivated in natural forests was the unique native variety with the required production traits selected and domesticated by Bulang People for thousand years, which is better to withstand natural disasters compared with those hybrid tea varieties from the modern technology due to its higher genetic heterogeneity. So, the arbor tea garden system has strong resistance to diseases and pests because of high stability of the system formed the mutual restriction relations between species. The system reflects the harmonious relationship that the ethnic groups in the area have with nature in terms of the values they hold and the behavior they display. Throughout their history, they accumulated experience as well as traditional knowledge and they integrated sustainable agroforestry systems within the biophysical environment. This study uses multi-disciplinary research methods to explore how the Bulang people succeed in cultivating arbor tea in natural forest while managing forests in a sustainable manner.

PP-82
EVALUATION OF THE ANTIBACTERIAL ACTIVITY OF TOTAL POLYPHENOLS FROM MEDICINAL PLANTS AGAINST 157 BACTERIA ISOLATED FROM RESPIRATORY INFECTIONS

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The use of medicinal plants for healing aroused our curiosity because of their beneficial effect on health. The objective of our study is the therapeutic value of some of them widely used in our country, to fight against respiratory infections. The methodology adopted in our research is based, first on the identification and isolation of 127 bacteria samples from 250 patients suffering from infections, and then studying their sensitivity to phenolic extracts. For this study, ten medicinal plants were selected. The phytochemical screening applied to the powder revealed a great wealth of secondary metabolites

endowed with antioxidant activities. The productivity of polyphenols varies between 35.58 % (white horehound) and 67.11 % (*Thymus vulgaris*). The results were instructive concerning the effectiveness of the inhibitory action of polyphenols on total bacteria studied: 50% of plants have prevented their multiplication, therefore their pathogenicity. Moreover, the action of some of these total polyphenols competed with that of antibiotics: 70% of antibiotic-resistant bacteria are susceptible. Regarding the obtained results, it should be noted that some of studied plants are prescribed in the armamentarium to fight against respiratory infections of bacterial origin.

PP-83
SIDERITIS BREVIBRACTEATA IMPROVE MEMORY AND LEARNING (EXPERIMENTAL STUDY IN MICE)

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The neurotoxicity of heavy metals such as aluminum is largely spread recently, without any exception of a young and old peoples, Alzheimer's is the most common form of dementias result by this metals. The current therapy of AD that is used in patients on a daily basis is exclusively hypothesis-driven and not causal. Indeed, there are only a limited number of drugs currently available. All these compounds are ACh-esterase inhibitors, which have only a modest effect on the progression of AD. Although stabilization of the neurotransmitter ACh is an obvious approach and may help to some extent to keep up the ACh-driven neurotransmission necessary for complex processes such as cognition and memory, these drugs is not the long awaited breakthrough. The idea of recent approach is by decreasing oxidative stress by means of antioxidant plants. The objective of this study is to clarify the positive effect of *Sideritis brevibracteata* used as a moderated treatment against neurodegenerative diseases including Alzheimer's caused by aluminum chloride. The mice were randomly divided into four groups; each group containing seven mice (for each experience: neurotoxicity (AD): control group, neurotoxicity, treated intoxicated groups and the control treated groups. AlCl₃ was dissolved in distilled water administrated orally (100 mg/kg) for the intoxicated group, and treated intoxicated groups, given for chronically (8 weeks); in parallel of *Sideritis brevibracteata* administration (60 mg/kg orally) respectively for the intoxicated treated group and the control treated groups received the same doses of *Sideritis brevibracteata* (60 mg/kg). The results of the neurologic studies showed that there are typical neuropathological changes in almost of treated intoxicated mice's behavior

& memory. In this investigation the effect of *Sideritis brevibracteata* with over load of aluminum chloride to mice lead to reduction of neurotoxicity and Alzheimer's disease appeared as improvement in neurologic appearances.

PP-84
ANTIBACTERIAL ACTIVITY OF FOUR SPECIES OF ALGERIAN ALGAE

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Marine organisms, as algae, are a rich source of biologically active metabolites. The aim of this work is to highlight the antibacterial activity of methanol extracts of four marine algae species: *Cystoseira tamariscifolia*, *Padina pavonica*, *Rhodomela confervoides* and *Ulva lactuca* of Bejaia's coast. Antibacterial activity was evaluated by agar diffusion method. Tested microorganisms were obtained from applied microbiology laboratory. Six human pathogenic microorganisms, such as: *Bacillus subtilis* (ATCC6633), *Listeria innocua* (CLIP74915), *Staphylococcus aureus* (ATCC 6538), *Escherichia coli* (N.A.R), *Klebsiella pneumonia* (E 47), *Pseudomonas aeruginosa* (ATCC27853) were used in the present study. Crude extracts of the four species of algae showed antibacterial activity. All the extracts showed activity against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Listeria innocua*. The majority of algal extracts were active against four or five microorganisms. In conclusion, the results obtained in this study suggest that algal extracts of Bejaia coast have a good antibacterial activity against pathogenic bacteria which makes them interesting for programs screening natural products. This ability is not restricted to one order or division within the macroalgae: all of them offer opportunities for producing new types of bioactive compounds.

PP-85
TRADE PROSPECTS AND CONSERVATION STATUS OF MEDICINAL PLANTS OF CHAGHARZAI VALLEY, NORTHERN PAKISTAN

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Indigenous communities mostly depend on gathering and trade of medicinal plants for primary health care and to

earn their livelihood. The present study document trade prospects and conservation status of the medicinal plants in the indigenous communities of Chagharzai Valley, Northern Pakistan. Out of 141 medicinally important plants, used in traditional medicine by the local community, 26 plant species were used for commercial purposes. Due to non-availability of local market, native community does not meet with trade prospects. Rising demands for medicinal plants in commercial sector have results in the form of collection pressure which indicate conservation measures. Similarly, Plants which are used for different ailments are vulnerable to more collection. Cultivation of medicinal plants and their sustainable use, coordination among the local people, trade men, government and non-government agencies for trade and commercial use of medicinal plants can provide opportunity to improve livelihood of the local communities.

PP-86
ANTIBACTERIAL AND ANTIFUNGAL
POTENTIALITY OF LEAF EXTRACT OF
PHYLLANTHUS FRATERNUS WEBSTER: AN
ETHNOMEDICINAL PLANT

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The increasing failures of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents have led to the screening of several medicinal plants for their potential antimicrobial activity. *Phyllanthus fraternus* Webster, a pan tropical weed originated from western India, belongs to family Euphorbiaceae and commonly known as “Bhumyamlaki”. It is medicinally very useful plant used by tribal folk of Gujarat to cure certain diseases like asthma, cough, diarrhea, diabetes, skin diseases and scabies. In the present study the antibacterial and antifungal potential of methanolic leaf extract (1000 mg/10 ml) of *Phyllanthus fraternus* was screened against eleven clinically important bacterial strains such as *E. coli*, *B. megaterium*, *B. cereus*, *B. subtilis*, *C. glutamicum*, *S. aureus*, *S. typhi*, *S. paratyphi* A, *S. paratyphi* B, *P. aeruginosa* and *P. vulgaris* and three fungal strains namely *A. niger*, *A. candida* and *P.chrysogenum* by disc diffusion method. Results showed maximum antibacterial activities against *C. glutamicum* with zone of inhibition of 40 mm diameter followed by *S. aureus* with the zone of inhibition of 39 mm diameter and minimum against *S. typhi* with the zone of inhibition of 15 mm diameter. Similarly the maximum

antifungal activity was noted against *A. niger* (40 mm). Absolute methanol was used as control during the experiments. Our preliminary phytochemical analysis of leaf extract using methanol as a solvent confirmed the presence of alkaloids, tannins, saponins, terpenoids and steroids. This indicates that antimicrobial activities may be due to the presence of secondary metabolites. Hence, the plant can be used to discover bioactive natural products that may serve as leads in the development of new pharmaceuticals research activities. As the antimicrobial work has not been carried out so far on *Phyllanthus fraternus*, the attempts are made to study the same.

PP-87
THE CHEMICAL COMPOSITION AND
CYTOTOXIC ACTIVITY OF THE ESSENTIAL OIL
OF PRANGOS HAUSSKNECHTII BOISS. ROOTS

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The present study was performed to investigate the chemical composition and cytotoxicity of *Prangos haussknechti* (from family Umbeliferaceae) wildy grown in West-Azərbayjan Province of Iran. The hydrodistillation of essential oil from the roots of the plant was subjected to GC/MS and then its cytotoxic activity was evaluated using MTT [3-(4, 5-dimethylthiazolyl)-2, 5-diphenyl tetrazolium bromide] assay on WEHI-164 line (mouse fibrosarcoma cells). 19 compounds comprising 96.2 % of the total oil were identified among which β -phellandrene (32%), δ -3-carene (22.7%), α -pinene (9.5%), germacrene-D (3.4%), α -humulene (3.8%), δ -cadinene (3.2%) and terpinolene (2.3%) were found to be the major constituents of the oil. The essential oil of *P. haussknechti* roots significantly demonstrated cytotoxic activity against WEHI-3 cells in a dose dependent manner. *P. haussknechti* essential oil at doses of 100, 200, 400 and 800 μ g/mL exhibited the percentage of inhibition value of 92.74 \pm 2.1, 93.22 \pm 1.6, 94.35 \pm 2.23, 96.65 \pm 3.2%, respectively. Etoposide (30 μ g/mL) as the positive control, showed an inhibition percentage value of 81.99%. The concentration causing 50% inhibition of the essential oil of *P. haussknechti* was calculated as, 2.7 μ g/mL. This study demonstrated the strong cytotoxic activity of the essential oil of *P. haussknechti* which could be attributed to its high monoterpene content.

PP-88
THE EFFECT OF THE METHANOLIC EXTRACT OF *MARRUBIUM VULGARE* L. ON ELECTROCARDIOGRAPHY AND HEMODYNAMIC PARAMETERS AFTER ISOPROTERENOL-INDUCED ACUTE MYOCARDIAL INFARCTION

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This study was designed to investigate the cardioprotective effect of the methanolic extract of *M. vulgare*, a popular medicinal herb, against isoproterenol-induced acute myocardial infarction (MI) in rats. Male wistar rats were assigned to MI and treatment groups (10, 20, and 40 mg/kg/12h of the extract given orally concurrent with MI induction). Isoproterenol (100 mg/kg; S.C.) for 2 consecutive days was used to induce acute MI. A standard limb lead II ECG was monitored continuously throughout the experimental period. To evaluate the cardiac left ventricular function, a Mikro Tip catheter transducer was inserted into the right carotid artery and then advanced to the lumen of the left ventricle. Isoproterenol injection exhibited changes in the electrocardiogram (ECG) pattern including ST-segment elevation and suppressed R-amplitude. Oral administration of the extract (10 mg/kg) restored R-amplitude from $230 \pm 9.2 \mu\text{V}$ (in MI group) to $442 \pm 13.2 \mu\text{V}$ ($p < 0.001$). Treatment with 10, 20 and 40 mg/kg of methanolic extract of *M. vulgare* greatly suppressed the elevated ST-segment from 240 ± 6 (in MI group) to 45 ± 7.8 , 66 ± 10 , and $68 \pm 5 \mu\text{V}$, respectively. A sharp reduction in left ventricular contractility (LVdP/dt_{max}) and relaxation (LVdP/dt_{min}) but a marked increase in the left ventricular end-diastolic pressure (LVEDP) was seen in the isoproterenol group. The extract (10 mg/kg) strongly ($p < 0.001$) increased LVdP/dt_{max} from 2750 ± 309 (mmH/sec) in the infarcted myocardiums to 5391 ± 377 . Similarly, treatment with 40 mg/kg of *M. vulgare* lowered the elevated LVEDP from 19 ± 1.2 mmHg to a normal value of 6.4 ± 1.7 ($p < 0.001$). These results suggest a protective effect for *M. vulgare* against MI.

PP-89
PHYTOCHEMICAL STUDY, ANTIMICROBIAL ACTIVITY AND LETHAL DOSIS OF DRY POWDER LIQUID EXTRACTS FROM *URGINEA MARITIMA* GROWING IN ALGERIA

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The phytochemical analyses were performed according to the protocols of Pharmacopoeias. The swelling index, equal to approximately 10, which indicates the presence of mucilage in large quantities in the plant, which controlled to the following results: Humidity (26.5%); loss on drying (28.44%); total ash (4.9%); sulphated ash (1.23%); hydrochloric ash (%); swelling index. Alkaloids were not observed. The presence of catechin tannins was confirmed. In addition, the galic tannins were not detected, while anthocyanins, flavonones and leucoanthocyanes were observed. The powder of plant was extracted with methanol. Then, the methanol extract was treated with 10% lead acetate. Extraction of cardiac glycosides was performed by a mixture of chloroform-isopropanol (SEShyr, EJStaba, 1976). Analysis of extracts was performed by TLC (SE Shyr and EJ Staba, 1976); and HPLC analysis (Mr. Fernandez and Mr. Dare C. Y Dios, 1987). Separation by TLC revealed the presence of 14 cardiac glycosides of bufadienolides: scillarène A (Rf=0.60), the proscillaridin A (Rf=0.95) and scilliroside (Rf=0.67), while HPLC was identified 22 compounds. UV spectroscopy showed a maximum at 298 nm (doubly unsaturated lactone ring). Moreover, the *Scilla maritima* has an antifungal activity against the growth of *Candida albicans*. The LD₅₀ value was $213 \pm 22 \text{mg/kg}$.

PP-90
HEPATOPROTECTIVE ACTIVITIES OF HALOPHYTE PLANT, *LIMONIUM TETRAGONUM* (Thunb.) Bullock, GROWING NEAR SEASHORES IN KOREA

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Halophyte plants growing near seashores have a long history of usage for alimentation, for their medicinal value, for their high salt contents. The edible young leaves and shoots of halophytes have been highly demanded by consumers for their salty taste and their high nutritional content which made it an ideal diet supplement. In the course of searching for

hepatoprotective natural products from halophyte plants growing near southern and western seashores in Korea, the methanolic extract of *Limonium tetragonum* leaves has been found to possess potent antiproliferative activities in murine hepatic stellate cells, HST-T6 cells. *Limonium tetragonum* (Thunb.) Bullock, which is also known as 'halophytic carrot' due to its carrot-like long straight roots, is a biennial plant in the family of Plumbaginaceae. Due to the lack of information on hepatoprotective effects of *L. tetragonum*, our work was aimed at investigating antifibrotic activities as well as possible effects in hepatocytes and macrophage cells. HSC-T6 cell is an immortalized rat hepatic stellate cells which retain most features of activated stellate cells, including expression of desmin, α -smooth muscle actin, and glial fibrillary acidic protein, and it can esterify retinol into retinyl esters. Culturing HSCs on uncoated plastic plates is known to cause spontaneous activation, leading to myoblastic phenotype, mimicking the process seen *in vivo*. Thus, we evaluated antifibrotic activity of *L. tetragonum* employing HSC-T6 cells by assessment of cell viability using MTT assay. The methanolic extract of *L. tetragonum* showed the inhibitory activities on HSC-T6 cells proliferation with statistical significance in dose-dependent manners for 48 h incubation. Also, excessive production and deposition of collagen in the activated HSC-T6 cells was significantly reduced by the pretreatment of *L. tetragonum*. To rule out the nonselectivity of the sample, the cytotoxicity in primary cultured rat hepatocyte was examined. The hepatocytes were intact up to 48 h in response to the treatment of *L. tetragonum* at the concentration up to 100 μ g/mL. To better understand the possible role of *L. tetragonum* in hepatic fibrosis, the immunomodulatory function was tested. The treatment of RAW 264.7 macrophage cells with *L. tetragonum* did not show any significant effects on the TNF- α production in the activated RAW 264.7 cells induced by lipopolysaccharide (100 ng/mL). Collectively, *L. tetragonum* is a potent antifibrotic natural product with highly specific for HSCs.

PP-91

ANTIBACTERIAL ACTIVITY AND VOLATILE COMPOSITION OF *ACHILLEA MILLEFOLIUM* AND *HERACLEUM ANISACTIS*

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In this study, the antibacterial activity and volatile compositions of two essential oils (EOs) obtained from *Achillea millefolium* and *Heracleum anisactis* for a potential use in preparation of an herbal mouthwash were investigated. The *in vitro* antibacterial activity of essential oils were determined at two different concentrations (1:1, 1:5) against two strains of Gram (+) bacteria [*Staphylococcus epidermidis* (ATCC 12228), *Staphylococcus aureus* (ATCC 25923)] and two strains of Gram (-) bacteria [*Escherichia coli* (ATCC 25922) and *Pseudomonas aeruginosa* (ATCC 27853)] which are the most common mouth pathogenic bacteria. Antibacterial activity of EOs was firstly screened by the disc diffusion method. Thereafter, the agar dilution method was employed to determine MIC of the EOs according to CLSI. The plants are widely distributed in Azarbayjan province and have been used as antiseptic in traditional medicine. EOs of the flowers of *A. millefolium* and the roots of *H. anisactis* were obtained by hydrodistillation and their compositions were analyzed by GC/MS. Terpinolene (%81) was the major compound in *A. millefolium* essential oil. In *H. anisactis* essential oil, myristicin (%94) was the main component. According to the results, the maximum inhibition zone diameter was obtained from *A. millefolium* against *Staphylococcus aureus* (19.8 \pm 0.3mm) and from *H. anisactis* against *S. epidermidis* (13 \pm 2.2mm) with MIC values, 27.5 μ g/ml and 34.5 μ g/ml. Our results revealed that the essential oils considered in this research possess a satisfactory antibacterial activity and could be used as natural antibacterial agents for the development of a novel herbal mouthwash.

PP-92

QUINOLINES, ANTIOXIDANT ACTIVITIES and STRUCTURE ACTIVITY RELATIONSHIP

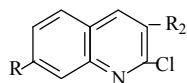
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Electron paramagnetic resonance spin trapping studies were applied to verify the hydroxyl radical scavenging activity of Quinoline compounds, with a spin trap agent 5,5 dimethyl-1-pyrroline-N-oxide (DMPO). Three compounds of four tested shown no any scavenging activity but the Chloroquinolinecarbaldehyde sub (I) scavenger the hydroxyl radicals with a certain relationship between concentration and scavenging efficacy that is higher than 85% at 80mM. Structure scavenging activity

relationship was derived from the kinetic evidence available on the formation and inhibition of (DMPO) spin adduct EPR signal of hydroxyl radicals (DMPO-OH). Important efficacy for scavenging hydroxyl radicals with sub (I), were the presence of aldehyde group that was substituted in the other compounds with phenol ethylene side chain.



I

PP-93 GINSENSIDE COMPOUND K INHIBITS SPHINGOSINE 1-PHOSPHATE INDUCED ANGIOGENESIS VIAREGULATION OF SPHINGOSINE KINASE-1 IN HUVECs

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Ginsenosides contained in *Panax ginseng* have exerted diverse biological activities against the generation of cancer, inflammation, allergy and diabetes. Typically, ginsenosides Rg3 and CK were reported to inhibit VEGF-induced cell proliferation, tube formation and chemoinvasion in human umbilical vein endothelial cells (HUVECs). However, other ginsenosides Rg1 and Re stimulated cell proliferation, tube formation and migration in HUVECs. Sphingosine kinase 1 (SPHK1) and related product, sphingosine 1-phosphate (S1P) are greatly involved in cell proliferation, migration and protection of apoptosis. Therefore, it is of interest to know whether ginsenosides can regulate SPHK1. For this purpose, we established the inhibitory assay of SPHK1 activity and analytical method for S1P and other sphingolipid metabolites in HUVECs. Ginsenosides CK which is an intestinal metabolite isolated from ginseng protopanaxadiolsaponins greatly inhibited SPHK1 activity, S1P production and HUVECs proliferation. Moreover, CK disrupted "sphingolipid rheostat" which determine the cell fate. CK reduced anti-apoptotic sphingolipid S1P and its release while increasing pro-apoptotic sphingolipid sphingosine and ceramides. Especially, main composition of increased ceramide was C24:0-ceramide. CK dose-dependently reduced HUVECs migration by reducing MMPs expression. Conclusively, ginsenosides CK uniquely act as a HUVECs migration inhibitor by regulating SPHK1 activity, related sphingolipid metabolites and MMPs expression.

PP-94 SYNTHESIS AND BIOLOGICAL EVALUATION OF SOME 3H 1,2-DITHIOLAN-3-ONES RELATED TO LEINAMYCIN

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The needs of the organisms in sulfur from 600 to 800 mg per day, rate easily accessible with a varied diet and balanced. The diet should be rich enough in proteins carrying sulfur amino acids (fish, eggs and meat). Also among the best plant sources are garlic, cabbage, broccoli, watercress, turnips, onions, leeks, asparagus and chives. In our laboratory we are interested in the synthesis of sulfur products that can replace foods containing sulfur needed by the organism and act as anti biotics. Many antibiotics are routinely used as antineoplastic agents. The natural product leinamycin, an antitumor antibiotic isolated from *Streptomyces* sp., displays potent antitumor and cytotoxic activities and an interesting activity against Gram-positive bacteria. Studies of the reaction between thiols and leinamycin performed by Gates' group revealed both a thiol-triggered DNA damage mechanism and a thiol-independent mode of DNA alkylation by this antibiotic. The intramolecular cyclization of 2,2'dithiodibenzoic acid with P₄S₁₀ offered 3H-1,2-benzodithiol-3-thione which, by oxidation with H₂O₂ gave 3H-1,2-benzodithiol-3-thione 1-oxide. The oxidative desulfuration of 3H-1,2-benzodithiol-3-thione with mercuric acetate afforded 3H-1,2-benzodithiol-3-one which was then oxidized to 1,2-dithiolan-3-one 1-oxides by the same procedure described above.

PP-95 FREE RADICAL SCAVENGING AND ANTI- OXIDATIVE ACTIVITIES OF GREEN TEA (*CAMELLIA SINESIS*) EXTRACTS

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Green Tea (*Camellia sinensis*) is one of the most consumed beverages in the world. Tea consumption may be linked

to low incidences of various chronic pathologic conditions, including cancer. The inhibitory activity of tea against tumorigenesis has been demonstrated in many animal models and has been suggested by some epidemiological studies. Such activity has generally been attributed to the antioxidant properties of the catechins. To study the association between green tea polyphenols consumption and reduced cancer risk in Algerian population, we evaluated first the antioxidant activity of green tea extracts *in vitro*. The extracts were tested for DPPH (2, 2-diphenyl, 2-picryl hydrazyl) radical scavenging, inhibition of lipid peroxidation, total phenol and flavonoid content. The extracts showed remarkable activity on DPPH test (IC_{50} of butanolic and acetate extracts are $7.56 \pm 0.74 \mu\text{g/ml}$ and $2.99 \pm 0.32 \mu\text{g/mL}$ respectively). While, 1% of butanolic and acetate extracts were 92.49 %, 93.12%. These values are similar to those obtained by vitamin C (94.42%) in the same concentration ($15 \mu\text{g/ml}$). On the other hand butanolic and acetate extracts exhibited the inhibition of lipid peroxidation with IC_{50} value $201.01 \pm 2.55 \mu\text{g/mL}$ and $302.18 \pm 28.31 \mu\text{g/mL}$, respectively. The reducing power of the extract depends on the amount of extract. The content of phenolic compounds was found in butanolic and acetate extract (99.97 and $140.05 \mu\text{g/mL}$ plant extract) respectively and expressed in Gallic acid equivalents (GAE). The flavonoid contents of butanolic and acetate extract were found to be 25, 16 and 8, 83 $\mu\text{g/mL}$ plant extract, respectively and expressed in quercetin equivalent. The results obtained in the present study indicate that green tea extract is a potential source of natural antioxidants especially acetate extract which rich by catechins.

PP-96

A COMPARATIVE STUDY ON ANTIOXIDANT CAPACITIES AND TOTAL PHENOLIC CONTENTS OF THREE EDIBLE UMBELLIFERAE SPECIES GROWING WILD IN TURKEY

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The fresh young leaves and shoots of *Anethum graveolens* L., *Crithmum maritimum* L., *Smyrniolum olusatrum* L. belonging to the Umbelliferae (Apiaceae) family, are traditionally consumed as vegetable by local people in Turkey. The aim of this study is to evaluate for the first time the antioxidant capacities of extracts of these species, which were prepared using Soxhlet apparatus

and by maceration in methanol and to determine their relationship with the phenolic contents. The antioxidant capacity of the fresh young leaves and shoots of these species were assayed with various methods, DPPH free radical scavenging, metal chelating and ABTS radical cation scavenging capacity, including total phenolic contents by Folin-Ciocalteu reagent (FCR). The obtained results were compared with standard antioxidants such as Ascorbic acid, BHT and EDTA. Cold methanol extracts of these species showed higher ABTS radical cation scavenging, DPPH radical scavenging, metal chelating capacity and total phenolic content than hot methanol extracts. It was shown extraction method has significant effect on total phenolic content and antioxidant capacity of Umbelliferae extracts.

PP-97

ANTHELMINTIC ACTIVITIES OF *MALLOTUS PHILIPPINENSIS* AND *EMBELIA RIBES*

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The *Mallotus* (*M.*) *philippinensis* (Family: Euphorbiaceae) and *Embelia* (*E.*) *ribes* (Family: Myrsinaceae) are the interesting examples of the ethnobotanicals used as anthelmintics with distinguish chemical diversity of the secondary metabolites. The two medicinal plants *M. philippinensis*, commonly called as Kamilla and *E. ribes*, commonly called as Bao barang, have been empirically used to treat helminths problem were evaluated scientifically to validate their biological activities. Cold maceration and soxhlet apparatus were used to obtain aqueous and aqueous methanolic extracts (70%). Mature larvae of *Haemonchus contortus* (stomach worm of sheep) and their eggs were used in adult motility assay (AMA) and egg hatch test (EHT), respectively. The extracts were applied with various concentrations (0.015, 0.031, 0.062, 0.125, 0.25, 0.5, 1, 2, 4 and 8 mg/mL) against the worms and their eggs. Levamisole (0.55 mg/mL) and oxfendazole (2 $\mu\text{g/mL}$) were served as positive and phosphate buffer saline as negative control in AMA and EHT, respectively. The results showed that both extracts of the plants caused mortality of the worm and inhibition of egg hatching. 80% and 61% mortality of the worms were observed at high doses (4 and 8 mg mL^{-1}) of *M. philippinensis* and *E. ribes*, respectively. The

extracts were more potent against eggs and inhibited 89% and 78% of hatching at high doses (4 and 8 mgmL⁻¹) of *M. philippinensis* and *E. ribes*, respectively. A graded-dose response was recorded in all the bioassays conducted in this study. Traditional use of these ethnobotanicals against helminths is justified as reflected by the result of this study.

PP-98

SURVEY OF MEDICINAL PLANTS FROM NATIONAL PARK OF GOURAYA (BEJAIA, ALGERIA) AND THEIR USE IN TRADITIONAL MEDICINE

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This study was take part in the national park of Gouraya which designated as a natural reserve by the international coordinating council of human and biosphere program of UNESCO in Paris and it classified as protected area in May 1992. The aim of this work is to determine the medicinal plants used traditionally by local population located around of the park. Using more than 300 interviews, ethnobotanical surveys were conducted in the study area during year 2011-2012. Among 51 spontaneous plants recorded, 12 were identified as medicinal plants. Asteraceae family is the most representative. This research was conducted with collaboration of the different users of plants such as ordinary users, herbalists, healers. This study was complemented by the identification of some samples in the field and Laboratory of Botany of Setif University with the flora and herbaria available to translate this knowledge into a popular traditional. This survey exhibited that plants used in the traditional medicine being major source of treatment of some diseases in different parts of Algeria. The results of this study showed that the most commonly used part of the plant is the foliage. Some remedies are prepared by infusion and decoction. Digestive diseases were the most frequently mentioned. This study may be also a guide of photochemical and pharmacological analysis and it can enhance the conservation of plant biodiversity of this protected area. We noted also that 27 Insects were captured by hand and vacuum mouth on these medicinal plants.

PP-99

MEDICAL PLANTS USED FOR FOLK MEDICINE IN OLTU (ERZURUM)

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This study was made to reveal the plants used as traditional folk medicine in Oltu (Erzurum). For this purpose, the field works have been done in July and August of 2012, February and April on 2013. The information such as local names, ailments treated or therapeutic effects, plant parts used, methods of administration, dosage have been recorded. As a result of interviews with the people living in the area, it has been determined that plants were very well known and used for almost everything by the older persons and most of these plants were recognized and known usage of that plants, even if have not been used by new generation in region. In the Oltu region, the 40 plant species appeared in 22 different families were defined. All collected folk drug species were identified by *Flora of Turkey* and prepared voucher specimen were deposited in the Herbarium of Anadolu University Faculty of Pharmacy (ESSE).

PP-100

CYTOTOXIC POTENCY OF *PORELLA CORDAEANA* (PORELLACEAE)

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The Bryophytes are divided into three different classes the Marchantiophyta (liverworts), Bryophyta (mosses) and Anthocerotophyta (hornworts). The bryophytes are placed taxonomically between algae and pteridophytes, and there are about 24.000 species in the world. Liverworts produce a large amount of mono-, sesqui- and diterpenoids, and aromatic compounds. Porellaceae is an important family in liverworts with a great diversity of the natural components. The cosmopolitan family Porellaceae includes about 60 species in two or three genera. *Porella* species (Porellaceae) mostly are rich sources of sesqui- and diterpenoids, many of which show interesting biological activities; such as, ornithine decarboxylase inhibitory activity, and inhibition of germination of higher plant, antitumor, cytotoxic and antifungal activity. There are limited studies with the chemical constituents of the *P. cordaeana*. The species has been collected from Southern of Turkey and extracted with diethyl ether. The extract of the species have been examined for its anticancer potential, on MTT assay against to cancer cell lines. In this presentation, the results will be submitted the anticancer potential of the extract from *P. cordaeana*.

PP-101
FLAVONOIDS of LIMONIUM THOUINI from
REGION ARID / ALGERIA

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The genus *Limonium*, formerly called "statice", distributes throughout the world and comprises over 180 species. Among them, 15-20 species have been horticulturally important as collected and dried flowers and they have been cultivated for commercial production in various regions of the world. In Algeria the *Limonium* genus is represented by 20 species of which 8 are endemic. In ongoing research on polyphenols from aerial parts collected from steppe vegetation have been studied as medicinal plants in Algeria. In the present work, we have investigated the phenolic compounds of *Limonium thouini*. Four flavonoids have been identified in this species using TLC, HPLC and paper chromatography, that were identified as quercetine (1), vitexin (2), myricetin 3'-O- glucoside (3), isoorientine (4). Compounds 1-3 were isolated for the first time from this species. Compound 4 has not been previously described in the genus in the literature.

PP-102
STUDY OF RADIOPROTECTIVE EFFECT OF
THEEXTRACT OF NASTURTIUM OFFICINALE
ONGENETIC EFFECTS INDUCED IN MICE
EXPOSED TO MGAMMA-RADIATION USING
COMET ASSAY

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Some of natural and synthetic products have protective properties against of Gamma-radiation which protect the blood cells against the destructive factors. This study

aimed to investigate the effect of extract of *Nasturtium officinale* on mice blood cells against of Gamma-radiation. This experimental study was conducted at Mazandaran University of Medical Sciences in 2012 on healthy adult male C57 mice. C57 of the breeds of animals tested mice with approximately 30±1 gram weight was selected. They are 15 groups of five mice in each group. Only the first and second groups received saline fluid into the peritoneal. Groups 3 until 9 received only coffee extract with a dose of 50mg/kg, 20mg/kg and 100mg/kg an intraperitoneal injection (Three groups was repeated for 15 days and three other groups received a single dose of gamma radiation received 2 hours ago). The second group received only the gamma rays. Finally, by gamma radiation dose of 6 Gray with 3 Gray in minute radiated until the skin was done from a distance of 80 cm. DNA damaging was assessed by the Comet test. Data collected using software from SPSS-19 statistical tests and these analyzed by ANOVA and T-test. Considering the obtained results, it seems in low dose the extract of *Nasturtium officinale* can be have more shielding effects against toxins on blood cells.

PP-103
FIRST GENERAL PROJECT OF
IDENTIFICATION AND CATALOG OF THE
SHAREHOLDERS OF NAPLES STATE GREEN.
SYNERGY BETWEEN UNIVERSITY AND THE
MUNICIPALITY OF NAPLES

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This work represents the first step towards a true 'Green Master Plan' for a large metropolitan area in the European Union, which is that of the City of Naples. The goal to reach is to obtain within two working years starting from next December, a precise computerized pointing map of the placement of approximately 40,000 examples in the municipal area by verifying the static and safety of each arboreal and shrub example; a card reporting the state of health, for instance, a plant health check. In addition, it is intended to carry on a scientific classification of each specimen, making everything accessible, through the net, at an international level. Everything will be realized thank to a synergy between the Municipality of Naples and the University of Naples-Federico II, through biologists-botanists, naturalists and agronomists.

PP-104 INVESTIGATION OF ANTIMICROBIAL, ANTIOXIDANT AND ANALGESIC ACTIVITIES ON *SALVIA OFFICINALIS* USING MALE ALBINO MICE

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This work aims to evaluate the antimicrobial, antioxidant and analgesic effects of methanolic extract of *Salvia officinalis* (Lamiaceae), which is named in Libya as Al-marimia. The antimicrobial activity of *Salvia officinalis* extract was evaluated using cup cut diffusion method against four microbial strains which are *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Candida albicans*. The antioxidant activity of *Salvia officinalis* extract was evaluated using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method. The analgesic activity of the extract was evaluated using the thermal method of nociception using mice (hot plate method). The extract produced antimicrobial activities against *Staphylococcus aureus* only; while *Pseudomonas aeruginosa* and *Escherichia coli* were not affected by the extract. Also *Salvia officinalis* methanolic extract didn't show any anti-fungal effect against the *Candida albicans*. The antioxidant activity of *Salvia officinalis* extract showed a moderate antioxidant effect through a moderate decrease in the absorption of (DPPH) at 517 nm using quercetin as a standard. The analgesic activity of the extract showed a significant central analgesic effect, which was similar to morphine in the doses used.

PP-105 THE EFFECT OF SALINE IRRIGATION WATER ON GERMINATION, EMERGENCE, SEED YIELD AND BIOMASS OF BLACK CUMIN

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A set of experiments were conducted under completely randomized design in the germinator, greenhouse and

field to investigate the effect of salinity on germination, emergence, biological yield, seed yield and plant height of *Nigella sativa*. Salinity of salt treatments were consist of 0.3 (control) to 39 ds/ m (at germination), up to 15 ds/m (emerging stage) and up to 9 ds/m (at seed set) was applied in this study. The effect of salinity on seed germination, seed germination rate, shoot length, root length, seedling weight of seed, root to shoot ratio and seed vigor was significant at $p < 0.01$. The highest germination rate 94.8% was observed in the salinity of 3 ds/m and no germination was observed at the salinity of 36 ds/m. Salinity from 0.3 (controls) up to 15 ds/m significantly ($p < 0.01$) influence on the rate and percentage emergence. The highest germination percentage 52.5% and emergence rate 9.2 seedlings per day were achieved in the control treatment. Seed yield, biomass and plant height were affected significantly ($p < 0.05$) against different salinity treatments. Plant performance was by associate salinity percentage with an increase in the salinity level from 0.3 to 9 ds.m⁻¹, the average seed yield and biological yield were decreased from 105.5 to 40.2 g.m⁻² and 550.2 to 268.6 g. m⁻² respectively.

PP-106 PHENOLIC COMPOSITION OF SOME WILD *SALVIA* SPECIES FROM IRAN

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Salvia L. plants (Lamiaceae) are rich sources of di- and triterpenoids, phenolic acids and flavonoids. Among the phenolic acids, caffeic acid derivatives such as rosmarinic acid, salvianolic acids A and salvianolic acid B are also present in *Salvia* extracts. For a long time, many species of *Salvia* have been traditionally used as medicinal herbs and recently a lot of attention has been given to the phenolic components of this genus due to their biological activities. The major purpose of this study was identification and determination of some phenolic acids in leaves and roots of five wild *Salvia* species (*S. officinalis*, *S. nemorosa*, *S. virgata*, *S. aristata* and *S. sclerea*) of Iran. The amounts of the phenolic compounds in the methanolic extracts of leaf and root samples were quantified by HPLC with UV detection (280 nm). Based on our results, the leaves of *S. officinalis* and *S. sclerea* with 14.14±1.48 and 40.27±2.05 mg/g DW were the richest sources of rosmarinic acid and salvianolic acid B, respectively. The highest content of salvianolic acid A

and phenolic diterpene of carnosic acid was found in root of *S. nemorosa* with values of 6.68 ± 0.96 and 10.02 ± 0.5 mg/g DW, respectively. Among the studied *Salvia* plants, carnosic acid was not detected in roots of *S. aristata*, *S. virgata* and *S. sclerea*. The current study demonstrates that some Iranian *Salvia* species can be considered as new potent natural sources of rosmarinic acid and its derivatives as pharmaceutical compounds.

PP-107

ANTIOXIDANT PROPERTIES OF *PULICARIA JAUBERTII* LEAVES CONSTITUENTS

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Herbal medicines have attracted considerable interest as alternative remedies because of their low toxicity and low costs. Many compounds of the plants can scavenge reactive oxygen species (ROS) and thereby directly reduce-oxidative stress. The *Pulicaria jaubertii* indigenous to Yemen, locally known as Anssif, is traditionally used as diuretic, pyritic conditions in urogenetic organs, and to cure fever. The flowers of *Pulicaria jaubertii* was also used as spice and in foods. The purpose of this study was to examine the potential antioxidant effects of different extracts chloroform (CHCl₃), ethyl acetate (AcOEt), and *n*-butanol (*n*-BuOH) of the leaves of *P. jaubertii* using standard model systems. The results revealed that AcOEt extract which had high level of polyphenols ($322,98 \pm 33,76$ GAE/g extract) and flavonoids ($159,80 \pm 22,1$ mg quercetin equivalents/g extract) exhibited the most potent antioxidant capacity in each assay, showing a high dose dependent manner scavenging activity of DPPH (96.87%), lipid peroxidation inhibition (89.34 %), OH quenching (63.3-84.13 %), ferrous chelating capacity (81.46 %) and a moderate reducing power (Absorbance $\lambda=700$ nm=1.24) compared to the *n*-BuOH extract which proved a moderate effect, and to CHCl₃ which was the weakest extract. The IC₅₀ values of AcOEt antioxidant activity followed the order: DPPH radical scavenging (7.17 µg/ml) > lipid peroxidation inhibition (31.19 µg/ml) > iron-chelating activity (79.4 µg/ml) > OH scavenging (105.63 µg/ml) > reducing power effect (233.45 µg/ml). The strong antioxidant activity of the *P. jaubertii* suggests

that the extracts obtained by polar solvents from the leaves could be used as an effective natural source of antioxidant and food additives.

PP-108

CORROSION INHIBITION BY *REUTERA LUTEA* (DESF.) MAIRE (APIACEAE) EXTRACT

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The ethylacetate extract of the aerial parts of *Reutera lutea* is tested as corrosion inhibitor of A283 Gr C steel, in acidic solutions, using the weight loss measurement, polarization technique and electrochemical impedance measurement. The adsorption of the inhibitor on C-steel surface was found to follow Freundlich adsorption isotherm. Negative value was calculated for the energy of adsorption indicating the spontaneity of the adsorption process. The inhibition efficiency increases as the added concentration of extract is increased.

PP-109

THE FLORA OF TURKEY: ON SOME TRADITIONS, RITES AND BELIEFS

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Turkey is plentiful of diverse plants used in every aspect of daily life and in every beneficial way, in medicine, cooking, tinting and in cosmetics. They heal us, supplement, flavour and scent our dishes, and perfume our bodies. They played an important role in daily life even in ancient times when their properties were also well known. To the surprising diversity of plants and the richness of forms and colors, corresponds, a diversity of traditional knowledge and social usages. The knowledge about plants and their usages, transmitted through generations have certainly evolved as time went by. Even today, they constitute, however, in certain occasions the tradition with its rites, practices, beliefs, customs and superstitions.

PP-110 ETHNO-MEDICINAL STUDIES from HIGH MOUNTAINOUS AREAS of GILGIT-BALTISTAN PAKISTAN

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Ethno medicinal studies from mountainous areas of Gilgit-Baltistan have been conducted during 2011-2012. It has very significant mountainous ranges, the Hindukash, the Karakoram and the Himalayas. These ranges contain some of the highest peaks of the world i.e. K2 (8611 m), Nanga Parbat (8126 m), Rakaposhi (7788 m). Locals belonging to different ethnic groups have distinct life styles, beliefs, traditions and cultural heritage. They are using indigenous plants for treatment of various diseases and this folklore treatment is considered cheapest source of curing diseases at local level. Information regarding ethno-medicinal plants was obtained from local inhabitants of old age. A total of 135 genera belonging to 66 families of Angiosperms and Gymnosperms were studied and described one by one, whereas 53 plant species have been recorded having well defined traditional medicinal uses. These plants have been utilized over many generations by various ethnic groups. Based on this information, the medicinal importance of plants has been determined. It was found that indigenous medicinal flora of the area is quite rich and is diverse, due to the difference in altitude, climate and other topographic conditions. It is expected that this research paper will be beneficial for locals, students, researchers, farmers, foresters and general public alike.

PP-111 ANTIBACTERIAL CAPACITY OF SELECTED ALGERIAN HONEYES

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The assessment of the *in vitro* antibacterial activity of different honey types in Algeria on Gram negative organisms, different concentrations (10, 30, 50, 70, 100 % v/v) of honey were studied *in vitro* using *Escherichia coli* (*E. coli*) and *Pseudomonas aeruginosa* (*P. aeruginosa*). Briefly, two-fold dilutions of honey solutions were tested to determine the minimum inhibitory concentration (MIC)

against each type of microorganism, followed by more assays within a narrower dilution range to obtain more precise MIC values. MIC was determined by both visual inspection and spectrophotometric assay at 620 nm. The antibacterial activity of these honey samples was determined by the disc and well diffusion method. The zone diameter of inhibition of honey for *P. aeruginosa* and *E. coli* was 0-30 and 0-38 mm, respectively, while the MIC ranged 90-91% and 56-96%, respectively. The results show that Algerian honeys possess antibacterial activity against Gram negative bacilli, and it can be developed into antibacterial agents.

PP-112 ANTIMICROBIAL ACTIVITY SCREENING OF SOME CUPRESSACEAE SPECIES

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The current study was carried out to determine the *in vitro* antimicrobial activities of etheric extracts of some Cupressaceae species collected from Turkey. The extracts of *Juniperus oxycedrus* L. subsp. *oxycedrus*, *Juniperus foetidissima* Willd., *Juniperus excelsa* Bieb., *Juniperus phoenicea* L., *Cupressus sempervirens* var. *pyramidalis* Nym., *Cupressus sempervirens* var. *horizontalis* (Mill.) Gord. were investigated against *Staphylococcus aureus* ATCC 25923, *S. aureus* ATCC 43300 (MRSA), *Bacillus subtilis* ATCC 6633, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, *Klebsiella pneumoniae* RSKK 574 and *Candida albicans* ATCC 10231. The disc diffusion method was used to determine the antimicrobial activities of extracts. The etheric extracts of the tested species exhibited weak antimicrobial activity against the various tested bacteria comparing with the standarts. No antimicrobial activity was observed against *C. albicans* for all the extracts.

PP-113 ANTIBACTERIAL ACTIVITY OF *PINUS HALEPENSIS* RESIN

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Resin of Aleppo pine (*Pinus halepensis*) is used in traditional medicine in Algeria for the treatment of

muscular pains, and disinfectant of the respiratory and urinary tracts for the antimicrobial principles. The resin was extracted using the boiling water; 1.9 g of the air-dried resin was ground into a fine powder in a blender and mixed with 90 mL boiling water by magnetic stirrer for 4 h. Then the aqueous extract was filtered over cheese-cloth and Whatman No. 1 paper, respectively. The filtrate was frozen at -20 °C in ultra-low temperature freezer and then it was lyophilized. The disc diffusion technique was used to evaluate the antibacterial activity of *Pinus* resin. 10 µL of powder resin by disc of Whatman paper N°1 was applied into Muller Hinten medium inoculated by a bacterial suspension [3]. The *Pinus* resin powder at a concentration of 275 µg/µl equivalent to 5.5 mg of crude resin, inhibited the growth of 6 bacteria, *Staphylococcus* coagulase, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Citrobacter* sp., *Proteus* sp. and *Klebsiella pneumoniae* with various diameters of inhibition, 13.3 mm, 22 mm, 12 mm, 8 mm, 7.5 mm and 7 mm respectively and did inhibited the growth of *Bacillus* sp.

PP-114
SCREENING OF IN VITRO ANTIOXIDANT POTENTIAL OF GENISTA QUADRIFLORA EXTRACT

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Recently there is an emerging trend in research to support the biological activities of medicinal plants. Many scientific researchers have been reported about the efficacious and chemotherapeutic role of medicinal plants in the treatment of diverse diseases. The present work is carried out to evaluate the antioxidant potential of butanolic extract of *Genista quadriflora* (Fabaceae) using various *in vitro* tests including DPPH free radical scavenging, metal ion chelating and reducing power ability. In addition, the total phenolic content was done by Folin-Ciocalteu reaction. These various antioxidant activities were compared with suitable standard antioxidants. In all the methods the extract showed noticeable antioxidant activity in a concentration dependent manner. *Genista quadriflora* might be a valuable antioxidant natural source and seemed to be applicable in both healthy medicine and the food industry.

PP-115
RAT LIVER LIPID PEROXIDATIVE INHIBITORY EFFECT OF CYNARA CARDUCULUS

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The interest for oxidative stress in relation to the development of disease has gained large attention during the last decades. Lipid peroxidation is an example of oxidative injury that has been extensively studied. Hence, compounds that inhibit lipid peroxidation process are of great interest as possible protective agent to help human body from the oxidative damage. Unavailability of rational therapy in modern medicine and no or very less positive influence of synthetic drugs in liver damage have urged researchers in this field to look for herbal drugs with better hepatoprotective action. The antioxidant activity of *Cynara cardunculus* butanolic extract (CCBE) was evaluated by the extent of protection offered against free radical-mediated lipid peroxidation; using both *in vitro* and *in vivo* assays. Results showed that CCBE possesses better dose dependent prevention towards Fenton reaction mediated lipid peroxide generation. The *in vivo* lipid peroxidation-mediated liver injury was induced by administration of paracetamol (APAR) to rats. CCBE remarkably prevented the elevation of liver lipid peroxides in APAR-treated rats. Furthermore, hepatic glutathione level and GST activity were significantly increased by the treatment with the extract. The probable mechanism of action of CCBE appears to be its effect as free radical scavenger and inhibitor of lipid peroxidation of liver plasma membrane.

PP-116
INFLUENCE OF THE MEDICINAL PLANT' EXTRACTS (ZEA MAYS) ON THE CRYSTALLIZATION OF CALCIUM PHOSPHATE DIHYDRATE (BRUSHITE)

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The urolithiasis constitutes a major problem to public health. It, increasingly every day, asserts itself as a sign which reflects our socio-economic life conditions, and our

dietary habits. Our research is an extension to the works carried out by the laboratory of phytochemistry and organic synthesis (POSL) on the existing relationship between the influence of natural products of the medicinal plants' extracts and the urolithiasis. The selection of these plants was done according to an ethnopharmacological survey on medicinal plants used in the region of the south west of Algeria to cure the urinary tract diseases. On the first stage, we have studied the crystallisation of phosphates "in vitro" without inhibitors. The work was resumed, and this time by crystallization with inhibitors in order to explore the influence of the medicinal plant extracts on the three phase of crystallization (crystal nucleation, crystalline growth and aggregation) of Brushite. The scientific name of used plant is *Zea mays* and Poaceae family. Most of the extracts of the used plant have an inhibiting effect on the size of crystals and aggregates of Brushite. It is very important for the aqueous extract of *Zea mays* (180 min). Finally, a deep study was conducted on the effective extract; we determined the influence of phytochemical constituents.

PP-117

A NEW TRITERPENIC DIESTER FROM THE AERIAL PARTS OF *CHRYSANTHEMUM MACROCARPUM*

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Chrysanthemum macrocarpum (Sch. Bip.) Coss. & Kralik ex Batt., is an endemic species used in traditional medicine as a scabicide and to treat intestinal infections. Touareg people also use this species in food for flavouring and as an herbal tea [1, 2]. We report here the isolation and structural elucidation of one new triterpene fatty acid diester, 3,21-dipalmitoyloxy-16 β ,21 α -dihydroxy- β -amyrine and two natural cyclitols, in addition to four known triterpenes, and seven known flavonoids from the aerial parts of *C. macrocarpum*. Their

structures were established on the basis of extensive 1D and 2D NMR (¹H, ¹³C, COSY, HMBC, HSQC, and ROESY) and ESIMS studies. The chloroform fraction and the isolated compounds taraxasterol and β -sitosterol were investigated for their antibacterial activity against *Staphylococcus aureus*, *Enterococcus faecalis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. The chloroform fraction and taraxasterol showed a weak antibacterial activity and were evaluated for their cytotoxic activity against human colon cancer HT-29 cells and human prostate carcinoma PC3 cells using a MTT assay. The results indicated that both the chloroform fraction and taraxasterol inhibited cell proliferation of both PC3 and HT-29 cells.

PP-118

FREE RADICAL SCAVENGING ACTIVITY AND ANTHOCYANIN CONTENT IN FLOWER OF *ADENIUM OBESUM* COLLECTED FROM YEMEN

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Anthocyanins are representative of plant pigments widely distributed in colored fruits and flowers. Due to anthocyanins are widely consumed, finding out additional biological activities related to these compounds would be of great interest. Anthocyanins are normally obtained by extraction from plants and the extraction methods currently employed are with the use methanol, ethanol, acetone, water or mixtures as solvents. In fact, the color stability of anthocyanins depends on a combination of factors, such as the structure and concentration of the anthocyanin, pH, temperature and presence of complex agents such as phenols and metals. The most common solvents used for anthocyanins extraction are aqueous mixtures of ethanol, methanol or acetone. Various analytical methods have been used to evaluate the antioxidant properties of phenolic compounds: the 1, 1-diphenyl-2-picrylhydrazyl (DPPH) assay proves the capacity of the antioxidants to quench the PPH radical, whereas the ORAC method is based on the loss of fluorescence of the -phycoerythrin protein or of fluorescein upon oxidation. The aim of this study was to investigate and compare *Adenium obesum* L. extracts obtained in ultrasonic condition with different water/methanol and water/ethanol extraction mixture acidified with 0.1% HCl. The extracts were analyzed for monomeric anthocyanins contents and antioxidant activities. The highest anthocyanins content (18340.9

mg/L) and the best free radical scavenging activity were obtained for the *Adenium obesum* extract with 100% methanol. Also, there is a good correlations between antioxidant activity ($R^2 = 0.9368$) for water/ethanol series extracts.

PP-119
ETHNOBOTANICAL PROFILE OF VARIOUS INDICATOR SPECIES IN TROPICAL DRY DECIDUOUS FORESTS OF PAKISTAN

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Tropical dry deciduous forests of Pakistan are one of the valuable natural resource of the country. Ethnobotanical survey was recorded in tropical dry deciduous forest of Pakistan for various indicator species, which were indigenous woody plants (trees and shrubs). Out of one hundred plants, each plant is used for multipurpose on different traditional ways by local communities; all the 100 plants were used for 11 different categories with different percentage and plant part used. They were used either as source of silk worm's feeder, pollen source for honey bees, veterinary medicine, fodder, fuel, timber, food, ornamental, shade and roadside tree, land stabilization, medicine for 54 different human ailments, important products of daily use, products of commercial importance etc. Quantitative ethnobotanical indices were applied to observe the relative importance and conservation status of each species. The present study is a valuable guideline for agro-forestry, forestry, silviculture, horticulture and wildlife departments.

PP-120
ETHNOBOTANICAL STUDY ON THE MEDICINAL USE OF *ROSMARINUS OFFICINALIS* L. IN M'SILA CITY (ALGERIA)

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Rosmarinus officinalis L. is frequently used in traditional medicine to treat many ailments and diseases. The objective of this work is to know the importance of this plant in folk medicine of the M'sila region (Algeria). The work was based on surveys made with 111 people: healers, experts and herbalists, whose ages range between 20 and > 60 years, using questionnaire to record information about the respondent, diseases treated by traditional medicine and plants as well as the recipes used in the treatment of a disease mentioned. Recipes used by the population were established. It was found that rosemary traditional recipes affect digestive (62.5%), genital (15.63%), urinary and nervous (6.25% each), respiratory and circulatory (3.13% each). The method of preparation involves the infusion (50%), decoction (26.67%), powder (10%) and maceration (3.33%). Other methods were mentioned such as fumigation or assembly of preparation methods cited.

PP-121
CONTRIBUTION TO PHYTOTHERAPY BY SOME SPECIES OF *HYPERICUM* ON ALUMINIUM NEUROTOXICITY, INTERACTION ALZHEIMER'S DISEASE EXPERIMENTAL STUDY IN MICE

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The permanent exhibition with small doses of the human to heavy metals such as Aluminum is increasingly recognized as one of the cofactors of certain neurological diseases, cardiovascular and autoimmune diseases. The aluminum (Al) is highly toxic, it was shown that it can disrupt brain development in humans as in animals; there is an increased risk of dementia, including Alzheimer's disease. The Aluminum could be implicated in the etiology of diseases other than Alzheimer's disease (neurological, skeletal, respiratory, mainly immunoallergic). Nowadays, aluminum toxicity is well established in the animal laboratory, and their neurotoxic effect is studied by means of behavioral tests, memory tests, and biological analyzes. Research on natural compounds of medicinal plants has accelerated in recent years because of their importance, hence the notion of herbal medicine which is based on the antioxidant effectiveness of the lesions induced by heavy metals. *Hypericum* functions as a powerful antioxidant; it has multiple biological activities beneficial to human health. Current treatments do not go beyond the inhibition of acetylcholinesterase, while herbal medicine, presented in this study species of hypericum can solve other problems of oxidative stress and reduces tissue damage. It was found that he had improved remarkable in memory retention and learning in the rate white blood cells as well as cholesterol.

PP-122
POISONOUS PLANTS GROWING IN WESTERN TURKEY

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For many years, humanity has been using plants both for food and healing. But in the late period some of these plants were found to have a toxic effect. Despite the fact that most of these plants are poisonous, on the condition that being taken in proper amounts they can be helpful and these helpful features are indicated in our study. Some of the medicinal plants using on a certain amount can cause poisonings. And also, poisonous parts of plants are changeable. For example, not only some parts of plants but also whole plants can be poisonous. Some poisonous plants accidentally using as food creates a great danger in terms of public health. Constituents of the plants allow us to see whether toxic effects have or not. These are mostly alkaloids, glycosides, oksalates-resinoids. This study includes poisonous plants growing in Izmir, Manisa and Balıkesir provinces which are western regions of Turkey. In addition, poisonous plants of each province are structured as table. This table is based on the various features of poisonous plants (local names, toxic components, benefits, damages, growing region). The approaches about poisonous plants in Turkey are not taken seriously and for this reason some people lose their lives every year. People in rural areas (especially children) must be informed about the plants.

PP-123
WILD EDIBLE PLANTS OF BALI VILLAGE, KIBRISCIK/BOLU (TURKEY)

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This study was performed to record wild edible plants of the Balı village (Kıbrısık, Bolu). Field works were performed in 2012 from April to October. Semi-structured interviews were made to collect information from the villagers and herbarium specimens were taken from each plant taxa which are stored at AIBU. Totally, 17 people were interviewed. We recorded information about informants' age, education, income, subsistence type, etc. As a result of identification of the collected material, 34 wild edible plant species were recorded. The list of plant taxa and information about the local preparation process is provided.

PP-124
AN ETHNOBOTANICAL STUDY OF THE THREE DISTRICTS FROM DENİZLİ REGION IN TURKEY

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Ethnobotany is provided by the word itself *ethno* (people) and *botany* (science of plants). In essence, it is a study of how people of particular cultures and regions make use of the plants in their local environments. People benefit from plants for various purpose (such as medicine, food, dye or firewood) ancient times. The study of traditional uses of plants in the world in general and in the Mediterranean region in particular has been progressively increasing during the past few decades. In this study, ethnobotanical usages of some wild and cultural plants growing in Acıpayam, Güney and Tavas districts from Denizli were investigated. The information data was obtained from local people by direct interviews and other related studies. The study revealed 97 taxa belonging to 57 families that were useful to the local people of study areas. These data classified according to the use of plants medicinal, food, dye, fodder, firewood, construction materials and other purposes.

PP-125
THE ETHNOBOTANIC CHARACTERISTICS OF THE REGION AMONG AVŞAR, ŞABANÖZÜ AND ÇİLE MOUNTAIN (POLATLI / ANKARA)

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This study is related to ethnobotany work realized at the Avşar, Şabanözü and Çile Mountain Region between 2008-2010 years. Plants used for food, medicine, animal food, heating and similar purposes by the residents in research area, are documented. In the realized study, 205 plant materials have been collected relevant in 58 families and 172 genuses. Among the sampled plants 84 food, 53 fodders, 29 medicinal, 12 handicraft, 10 fuel plants, and about 102 plants with various uses were recorded. The largest families according to the number of plant that in the research area are as follows: Compositae (Asteraceae) 26, Rosaceae 20, Leguminosae (Fabaceae) 18, Labiatae (Lamiaceae) 13, Gramineae (Poaceae) 9, Umbelliferae (Apiaceae) 8, Liliaceae 7, Cruciferae (Brassicaceae) 6, Boraginaceae 6 and Solanaceae 6.

PP-126
VOLATILE CONSTITUENTS OF THREE *PINUS L.*
SPECIES (PINACEAE) FROM CANADA

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In this study, three *Pinus L.* taxa from Canada (*P. aristata* Engelm., *P. flexilis* E. James and *P. clausa* (Chapm. ex Engelm.) Sarg., have been studied to determination taxonomical classification based on chemical characters. For this purpose the essential oils from the leaves of *P. aristata*, *P. flexilis* and *P. clausa* were investigated by HS/SPME and GC/MS. Twenty nine, thirty two and forty seven components were determined from *P. aristata*, *P. flexilis* and *P. clausa*, respectively. Caryophyllene (27.60%), α -pinene (15.90 %), 3-carene (11.40 %) and naphthalene (9.37%) in *P. aristata*; acetic acid (31.12%), bicyclo (2.2.1) heptan-2-one (21.45%) and germacrene D (6.13%) in *P. clausa*; α -pinene (33.29%), β -pinene (16.24%), borneol (8.64%), and limonene (8.06%) in *P. flexilis* were identified as main components. Consequently, α -pinene chemotype in *P. aristata* and *P. flexilis*, whereas acetic acid chemotype in *P. clausa* from Waterloo region of Canada. The results have given some clues for the chemotaxonomy of genus and usable potentials of the plants as renewable resources.

PP-127
ESSENTIAL OIL COMPOSITION
OF FOUR *PICEA MILL.* (PINACEAE) TAXA FROM
CANADA

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The volatile components extracted from the headspace (HS) of *Picea Mill.* samples and their separated leaves using solid phase microextraction (SPME) were analyzed by gas chromatography-mass spectrometry. Thirty two, thirty four, twenty seven and twenty four compounds were identified representing 91.85%, 92.70 %, 92.38%, 94.06% of the oil, respectively. Thirty two compounds were determined; the main components were bornylacetate (29.40%), camphor (26.43%), β -myrcene (7.47%) and camphene (7.01%) in *P. pungens*. Thirty four compounds were identified; the main components were camphene

(22.03%), bornylacetate (21.64%), α -pinene (16.62%) and borneol (7.79%) in *P. mariana*. Twenty seven compounds were detected; the main components were bornylacetate (31.25%), limonene (17.27%), α -pinene (15.85%) and camphene (13.65%) in *P. omorika*. Twenty four compounds were determined, the main components were borneol (12.38%), α -pinene (10.36%), germacrene D (9.86%) and δ -cadinene (8.25%) in *P. rubens*.

PP-128
BENEFICIAL EFFECTS OF THE LEAVES OF
MELISSA OFFICINALIS ON PAINFUL DIABETIC
NEUROPATHY IN RATS

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Diabetic neuropathic pain is one of the most difficult types of pain to treat, that warrants the investigation of the newer agents to relieve this pain. Recently, treatment of diabetes mellitus and its complications has focused on the usage of plant products. We investigated the efficacy of oral administration of the leaves of *Melissa officinalis* hydroalcoholic extract (400, 600 and 800 mg/kg) on experimental models of neuropathy in streptozocin (STZ)-induced diabetic rats. Nociception tests were performed 4 weeks after the onset of hyperglycemia. At the end of the experiment, all rats were weighed and then underwent plasma glucose measurement. Diabetes caused significant hyperalgesia and allodynia during these tests. *Melissa officinalis* (600 and 800 mg/kg) reversed thermal hyperalgesia and chemical hyperalgesia in the early phase of formalin test in diabetics. Administration of *Melissa officinalis* (800 mg/kg) was altered pain responses in the late phase of formalin test in the diabetic group. The dose of 800 mg/kg also reversed tactile allodynia in diabetics. *Melissa officinalis* administration did not affect on the body weight and plasma glucose level of treated animals compared to non-treated animals. This study shows *Melissa officinalis* efficacy in amelioration of some aspects of experimental diabetic neuropathy in rats. Therefore, *Melissa officinalis* appears to be a promising candidate for treatment of painful diabetic neuropathy after confirming by future clinical studies.

PP-129
MELISSA OFFICINALIS REVERSES MORPHINE-
INDUCED MEMORY IMPAIRMENT IN MALE

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The leaves of *Melissa officinalis* are reported to have a wide range of biological activities, such as

neuroprotective and antiemetic effects. On the other hand, learning and memory can be affected by opioids. In this study, we hypothesized that treatment with hydroethanolic extract of *Melissa officinalis* leaves (400, 600 and 800 mg/kg) would effect on morphine-induced memory impairment in rats. On the training trial, the rats received an electric shock when the animals were entered into the dark compartment. Twenty-four hours later, the time latency for entering the dark compartment was recorded and defined as the retention trial. The rats were divided into (1) control, (2) morphine which received morphine before the training in the passive avoidance test, (3-5) three groups treated by 50, 150 and 450 mg/kg of *Melissa officinalis* extract before the training trial. The time latency in morphine-treated group was lower than control ($P < 0.01$). Treatment of the animals by 600 and 800 mg/kg of the extract before the training trial increased the time latency and decreased the time spent in dark partment at 24 hours after the training trial. The results revealed that the *Melissa ofiicinalis* extract attenuated morphine-induced memory impairment.

PP-130 PATTERNS OF MEDICINAL PLANT USE BY LOCAL BRAZILIAN POPULATIONS: A MACROSCALE INVESTIGATION

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Although the relationship between local people and plants may be idiosyncratic, some human behaviors are common to different communities and can be influenced by cultural and environmental factors. Thus, this study drew upon a systematic review to evaluate whether the forms of exploitation of medicinal plants were similar in different local communities in Brazil. The factors evaluated concerned the origin of the species used (native vs. exotic), plant habit (woody vs. non-woody) and plant parts (perennial and non-perennial). Two kinds of analysis were performed: the integrative (all data analyzed together) and the meta-analytical (studies as samples). A total of 34 studies served as the basis for this systematic review. The factors varied depending on the ecosystems in which the studies were conducted. In the Amazon, Cerrado and Caatinga, native and woody medicinal species dominated; conversely, this pattern was not the case for the Atlantic Forest and Pampas, where herbs and exotic species dominated. Perennial plant parts were predominant in the Cerrado, and considering only native plants, perennial parts dominated in the Amazon, Cerrado

and Caatinga. Urbanization did not significantly affect these patterns. Additionally, the species RI did not change as a function of the ecosystem or urbanization. Therefore, the environmental influence in plant use patterns has shown to be clear, but only in terms of number of species and not in terms of species' importance. The phenomena observed in this study can be explained in light of the chemical ecology and historical and cultural aspects.

PP-131 PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY OF ASPARAGUS LARICINUS STEM AND LEAVES EXTRACTS

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Phytochemicals or secondary metabolites are chemical compounds formed during the plants normal metabolic processes and plants use them to protect themselves. Free radicals are important mediators that provoke inflammatory processes and are neutralized by antioxidant which exerts anti-inflammatory effect. Most phytochemicals have antioxidant activity and protect human cells against oxidative damage. The aim of this study was to investigate phytochemical constituents; total phenolic content and antioxidant potential of *Asparagus larycinus* stem and leaves extracts. Qualitative phytochemical analysis of these plant extracts confirms the presence of tannins, saponins, flavonoids and phlobatannins. The leaves extract further confirmed the presence of glycosides, steroids, terpenoids and carbohydrates. The phenolic contents (Folin-Ciocalteu method) of both the extracts, as well as the scavenging activity on DPPH (2,2-diphenyl-1-picrylhydrazyl) was determined. The DPPH assay of the leaves extract was compared with standard antioxidant, ascorbic acid, and it showed effective free radical scavenging activities ($SC_{50} < 2.5$ mg/mL), while stem extract had no free radical scavenging activity. *Asparagus larycinus* leaves (72.10%) showed potent activity at the concentration of 2.5 mg/mL than compared to standard ascorbic acid. Our results indicate that, aqueous extracts of *Asparagus larycinus* leaves is a potential source of compounds that scavenges free radicals. These results support the validity of the traditional uses of this species against inflammatory disorders.

PP-132

EVALUATION EFFECT OF DROUGHT STRESS ON FLOWER YIELD, ORGANIC SOLUTES, ESSENTIAL OIL AND CHAMAZULENE PERCENTAGE OF 3 CHAMOMILE (*MATRICARIA RECUTITA* L.) CULTIVARS

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In this research, the effect of drought stress on growth, photosynthesis, essential oil yield and chamazulene percentage of 3 chamomiles (*Matricaria recutita* L.) cultivar in Islamic Azad University, shoshtar branch was studied. The experimental was split-plot in the basic of randomized complete blocked design (RCBD) with 4 replications. Main plots consisted of drought stress levels included control, medium stress (75% field capacity) and hard stress (55% field capacity) and sub-plots included 3 chamomile cultivars (Presov, Bodgold and Sherazi). Results showed drought stress had significant effect on photosynthesis, plant height, organic solute concentration, flower yield, essential oil and chamazulene percentage of chamomile cultivars. Medium stress level did not effect on essential oil yield of chamomile cultivars compared control. Under highest drought stress level, Presov and Bodgold cultivars had highest flower yield (123.4 and 121 gr/m²), essential oil yield (0.159 and 0.163 gr/m²) and chamazulene percentage (4.81 and 5.71 %). the results showed that chamomile could present acceptable economic essential oil yield with sufficient medicinal properties like chamazulene and estragole percentage under medium drought stress condition (170) but severe drought stress treatment (155) significantly decreased chamomile growth, photosynthesis rate and essential oil yield. Khorasaninejad et al found medium drought stress increased some of medical compounds and essential oil yield of Peppermint (*Mentha piperita* L.).

PP-133

THE ESSENTIAL OIL COMPOSITION AND ANTIOXIDANT ACTIVITY OF *ACHILLEA* SP. GROWING IN THE SOUTH WEST OF IRAN

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The composition of essential oil from *Achillea eriophora*, *Achillea millefolium*, *Achillea biebersteinii* and *Achillea tenuifolia* growing wild in the Southwest of Iran, was

analyzed. Clevenger apparatus was used to extract the oils by hydro distillation from leaves and head branches for 3 hour according to the method described in British Pharmacopeia. The ability of oil on scavenge free radicals was assayed by using a synthetic free radical compound 1, 1-diphenyl-2-picrylhydrazyl (DPPH), according to the method employed by Bersuder et al. *A. eriophora*, *A. millefolium* and *A. tenuifolia* essential oils were characterized by sabinene, 1,8-cineole, terpinene-4-ol, α -bisabolol, p-cymene, β -pinene and α -pinene. The *A. biebersteinii* essential oil was characterized by sabinene, borneol, camphor, piperitone and α -pinene. Antioxidant activity was analyzed using the 1,1-diphenyl-2-picrylhydrazyl free radical scavenging and Fe³⁺ reducing power methods. Results indicated essential oil obtained from *A. eriophora*, *A. millefolium*, *A. tenuifolia* and *A. biebersteinii* exhibited a dose-dependent increase with a radical scavenging effect of 85.0 %, 82.0% , 82.0 % and 64.0 % at 350 μ g/mL, which are close to the 1,1-diphenyl-2-picrylhydrazyl inhibition of the positive control ButylatedHydroxytoluene (BH) (88.0%) at the same concentration. It was shown that the *A. biebersteinii* essential oil exhibited the weakest antioxidant effect than ButylatedHydroxytoluene or other *Achillea* spp essential oils. In this study chamazulene, α -bisabolol and α -bisabolol oxide percentages were higher in *A. eriophora*, *A. millefolium* and *A. tenuifolia* essential oil compared to *A. biebersteinii* essential oil and the compounds improved antioxidant capacity of *Achillea* sp.

PP-134

TOTAL PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF *ARTEMISIA HERBA ALBA* ASSO. EXTRACTS FROM ALGERIA

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The plants kingdom includes thousands of families with therapeutic virtues. The genus *Artemisia* (Asteraceae family) includes about 400 species among them 11 spontaneous species are present in Algeria. *Artemisia herba alba* Asso. commonly known as white wormwood or desert wormwood (local name "chih"), is used since ancient times in folk medicine to cure digestive pains. Aqueous and organic (acetone) extracts from aerial parts of the flowering plant were obtained by maceration and by using Soxhlet apparatus respectively. Total phenolics determined in aqueous and organic extracts according to Folin-Ciocalteu method were 1.35 mg/g and 0.32 mg/g expressed as caffeic acid equivalent respectively, whereas flavonoids contents were 0.53 mg/g and 0.54 mg/g expressed as quercetine equivalent respectively. Free

radical scavenging effects were evaluated using 2, 2-diphenyl-1-picrylhydrazyl (DPPH). The IC₅₀ were 237 µg/mL and 331 µg/mL, for the aqueous and organic extracts. These effects seem to be weak when compared to that of the standard antioxidant BHT (IC₅₀ 82 µg/mL).

PP-135 TOTAL POLYPHENOL CONTENT AND ASSESSMENT OF ANTIOXIDANT ACTIVITY OF SELECTED MEDICINAL PLANTS

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The present work aims to assess the total polyphenols content and In vitro antioxidant activity of aqueous and methanol extracts of three selected medicinal plants used in traditional medicine; *Eucalyptus globulus*, *Peganum harmala* and *Nigella sativa*. The antioxidant capacity was evaluated by applying two methods; β-carotene bleaching assay and the 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free-radical scavenging assay. The MeOH extracts presented high levels of polyphenolic compounds (up to 333 ± 0.77 µg gallic acid equivalents (GAE) / mg plant extract. The antioxidant activity of the three selected medicinal plants was found to be dose dependent with polyphenols concentration. The alcoholic extracts displayed stronger antioxidant capacity than aqueous extracts. Using the DPPH free radical scavenging assay, the MeOH extract of *E. globulus* showed the highest antioxidant activity (IC₅₀=14.8±0.61 µg /ml). The test of β-carotene bleaching indicates that the MeOH extract of *E. globulus* showed the highest percentage of the antioxidant activity (69.9%). Results of this study demonstrate that leaf extracts of *E. globulus* possess strong antioxidant properties and therefore could be used in pharmaceutical industries.

PP-136 OCCURRENCE OF FLAVONOID AGLYCONES IN *CENTAUREA MELITENSIS* L.

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The genus *Centaurea* (Asteraceae) comprises about 500 species which are predominately distributed around the Mediterranean area and Western Asia. Amongst the biological effects exerted by *Centaurea* species, it is noteworthy that several species were particularly recommended against inflammatory conditions such as abscesses and asthma (*Centaurea iberica* Trev.ex Sprengel), to reduce fever (*Centaurea calcitrapa* L., *Centaurea jacea* L., *Centaurea iberica* Trev.ex Sprengel, *Centaurea solstitialis* ssp. *solstitialis*). Our work focused on to identify the secondary metabolites of the Algerian plant *Centaurea melitensis* L. The methanolic extract of this plant was subjected to a series of column chromatographic to obtain three flavonoid aglycones (Nepetin, hispidulin and jaceosidin). The structures elucidations of these compounds were based on combination of the spectroscopic methods (UV, ¹H and ¹³C NMR) and by direct comparison of the spectral data with published data.

PP-137 IN VITRO ANTIOXIDANT AND CYTOTOXIC ACTIVITY OF *MUSCARI* *MUSCARIMI* MEDIC.(ASPARAGACEAE) FROM TURKEY

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Muscari is a genus of perennial bulbous plants native to Eurasia that produce spikes of dense, most commonly blue, urn-shaped flowers resembling bunches of grapes in the spring. There are a lot of floristic studies about genus *Muscari*. They have the economic and pharmaceutical importance. Antioxidant activity usually means the ability of a compound to delay, inhibit, or prevent the oxidation of oxidizable materials by scavenging free radicals and reducing oxidative stress. Antioxidants can scavenge ROS (Reactive Oxygen Species) to protect the cells from damage caused by the latter. Brine shrimp lethality test is used for screening of plant extract toxicity, food additive, drugs screening and isolation active components from herbal extracts. In this study, the ethanolic extracts of bulb and flower from *M. muscarimi* used for their cytotoxicity using brine shrimp (*Artemia salina* L.) lethality test as described by Krishnarajuet. al. Antioxidant activity of the extracts of *M. muscarimi* was determined by using β-carotene-linoleic acid assay. This assay depends on the principle that β-carotene discolors rapidly when no antioxidant is present as a result of the process in which free radicals produce hydroperoxides from linoleic acid. Both bulb and flower ethanolic extracts showed antioxidant and cytotoxic activity.

PP-138
INVESTIGATIONS OF ETHNOBOTANICAL ASPECT OF WILD PLANTS SOLD IN ESPIYE (GİRESUN) LOCAL MARKETS

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This study focused on the wild plants which are important commercially. It was carried out with the purpose of identifying commercial wild plants that sold in the local markets of Espiye (Giresun) region. Field study was carried out over a period of approximately 1 year (2012-2013). The main material of this study being plants gathered and sold in the region. Field work was concentrated in the zones where the plants in question are most intensively gathered, as well as in the local markets where the plants are offered for sale. Interviews were conducted with people in research area and settlement. Resource people were selected who has knowledge and experience about topic and recognized around the people. The information was obtained from 40 resource people. Ethnobotanical data were collected through these studies. Working group is composed of usually 3, sometimes 4 people. As result of researches at the local markets ethnobotanical uses of 32 plants were recorded. These included folk medicine, herbal tea, spices and food. The most common ethnobotanical plant families were Rosaceae, Lamiaceae, Apiaceae, Asteraceae, and Fabaceae.

PP-139
AN INVESTIGATION ON PLANT USED HANDCRAFTS IN ESPIYE (GİRESUN)

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In this study, the plants used handicrafts of the local people living in Espiye (Giresun) district were

investigated. Plants that benefit from handicrafts of local people such as woodworking, basket, seat, canopy, amulets, brooms, dyestuffs and so on were identified and usage of these plants have been revealed. To transfer in a healthy way to future generations by identifying preserved plants and to investigate systematically traditional knowledge belonging to plants that use handicrafts of local people in Espiye (Giresun) are the main targets of this study. The research was conducted in villages and local markets where belong to Espiye district of Giresun. Field study was carried out over a period of approximately 1 year (2012-2013). Interviews were conducted with people in research area and settlement. Resource people were selected who has knowledge and experience about topic and recognized around the people. In the region, 27 plant taxa were identified to be used in handicrafts. With this study, products derived from plants collected from vicinity and theirs processing phases have been recorded. In area; wood works (13 taxa), dyestuffs (3 taxa), broom (3 taxa), basket-seat (5 taxa) and 3 taxa to be use of other areas were determined.

PP-140
A COMPARATIVE STUDY OF THREE ALOE SPECIES USED IN TREATMENT OF SKIN DISEASES IN SOUTH AFRICAN RURAL COMMUNITIES

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Aloe species have been noted to be a miracle cure used by indigenous people of Southern Africa. Geographically, each of the three *Aloe* species (*Aloe arborescens*, *Aloe excelsa* and *Aloe ferox*) has a specific habitat. Although some species overlap in geographical regions, the species most abundant in a region is most often utilized by indigenous people. All three species display similar curative properties, aiding in wound healing, cures against other skin ailments, and some systemic conditions. All three *Aloe* species indicated high inhibitory activity against all Gram (+) bacteria under investigation. The ethanol extract was most effective and inhibited all Gram (+) bacteria and two Gram (□) bacteria (i.e. *Proteus vulgaris* and *Escherichia coli*). All fungal species under investigation were successfully inhibited by both the boiled water as well as the ethanol extract.

PP-141

TRADITIONAL FOLK MEDICINE IN BALI VILLAGE/KIBRISCIK, BOLU (TURKEY)

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Field surveys were made to determine the traditional medicinal plants in Bali village in 2012. Semi-structured interviews were made to collect information from the villagers and herbarium specimens were taken from each plant taxa. Totally, 17 people were interviewed. We recorded information about informants' age, education, income, subsistence type, etc. More than 50% of the informants were older than 50 and majority of them were women. After identification of the specimens, we determined 15 different wild plant taxa with medicinal usage. Information about these plants, methods of preparation and their local usage are given in the presentation.

PP-142

ETHNOBOTANICAL STUDY OF "KAILI INDE TRIBE" IN CENTRAL SULAWESI INDONESIA

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The research entitled "Ethnobotanical Study of Kaili Inde Tribe in Central Sulawesi Indonesia" has been conducted from April to June 2012 at the Mantikole, a village of Kaili Inde which is located in Palu Valley. This village administratively belongs to Mantikole, District, Sigi Regency and Central Sulawesi. In order to know the interaction between local people with their environment especially plant biodiversity being used in their daily lives. The basic data such as traditional plant use in the village has been collected by using direct interview and establishment of transect. Village leaders, religious leaders, traditional healers, government officers and crafts-people are the target groups were interviewed during the study. These interviews were recorded with audio recorders and notebooks. Photographs were also

taken to record information. To understand the effect of daily activity of local people studied on their environment, transect or plot has been established where size and form of transect or plot is very depend on environment condition. The observation was included vernacular name, scientific name, family, and plant habitus. All of plant materials used for this purpose have been collected in the field and then identified at the Herbarium Celebense (CEB) Tadulako University. Data were analyzed quantitatively using the formula Cultural Significance Index (CSI). The results showed that there were 94 plant species consisted of 46 families used by tribes kaili Inde. 39 species used as food, 62 species as medicine, as a building material 6 species, 23 species used for traditional rituals and 10 plant species for use as handicrafts. Plant species that have the highest CSI was "Pa'e" (*Oryza sativa* L), followed by sweet potato "Untoku" (*Ipomea batatas*), "Pia'lei" (*Allium cepa*), "affo" (*Schyzostachyum brachy-cladum*), "kamonji" (*Artocarpus communis*), "tunau" (*Arenga pinnata*), "lemo barangay" (*Citrus aurantifolia*), "cangkore" (*Arachys hypogea*), "gampaya" (*Carica papaya*), "siranindi" (*Kalankoe pinnata*), "kasubi" (*Manihot esculenta*) and "srikaya" (*Annona squamosa*), while the lowest CSI was "Camara" (*Casuarina junghuniana*).

PP-143

SALVIA SEED OIL: A RICHEST SOURCE OF OMEGA-3 AND OMEGA-6 FATTY ACIDS

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Salvia L. is one of the most important genera of the Lamiceae family that some species of this genus have a vast usage in traditional medicine and culinary. A very limited number of investigations for fatty acid patterns have been reported in this genus. This study was accomplished in order to appraise the fatty acid composition of the oils obtained from the seeds of some wild *Salvia* species from Iran. Seeds of eight *Salvia* species (*S. ceratophylla* L., *S. macrosiphon* Boiss., *S. nemorosa* L., *S. reuterana* Boiss., *S. sclarea* L., *S. spinosa* L., *S. verticillata* L., *S. virgata* Jacq) were collected from their natural habitats. Seed oils were extracted using *n*-hexane as solvent in a Soxhlet apparatus. The fatty acid compositions were analyzed by GC and GC/MS as methyl ester derivatives after transmethylation reaction. The average of total oil ranged from 22.04% in *S. verticillata* to 38.45% in *S. sclarea*. Major fatty acids were linoleic

(C18:2n6) (16.44-33.19%), α -linolenic (C18:3n3) (33.87-53.60%), oleic (C18:1n9) (12.29-23.20%), palmitic (C16:0) (4.26-7.70%), and stearic acid (C18:0) (2.07-2.80%). Saturated, mono-unsaturated and poly-unsaturated fatty acids in total were obtained 6.62-9.65%, 12.67-24.67% and 59.90-78.87%, respectively. Total percentages of unsaturated fatty acids accounted for 84.57% to 91.54% of the total fatty acids. There were significant differences between fatty acid profiles of samples based on n-3 (38.58-53.67%) and n-6 (16.79-27.72%) fatty acid concentrations. In general, investigated *Salvia* species could be evaluated as the alternative wild sources for the production of essential fatty acids as special dietetics and pharmaceuticals.

PP-144

DOCKS AS SOURCE OF ANTIOXIDANTS-POLYPHENOL CONTENT AND ANTIOXIDANT ACTIVITY OF ROOTS FROM THREE WILD RUMEX SP.

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Common, broad-leaved plants from the genus *Rumex* are known as docks, closely related to other species from this genus, known as sorrels. Garden Sorrel (*R. acetosa*) is well known as a food plant, for its sour-tasting leaves, but various organs of several dock species have been used as folk medicines, applied both externally for skin problems (for example to treat stinging or itching) and internally against gastric disorders. Their marked astringent properties have been attributed to high tannin content, that determine typical therapeutic usage. In this paper, we compared roots of three common European dock species by phytochemical and antioxidant screening, with focus on traditional Central and Eastern European ethnomedicinal drug, *Hydrolapathi radix*. The roots of *R. hydrolapathum*, *R. obtusifolius*, and *R. crispus*, were sonicated with 70% MeOH. The crude MeOH extracts were re-extracted by liquid-liquid fractionation with dichloromethane and n-butanol. BuOH fractions were purified by eluting through Amberlite stationary phase with increasing aq. MeOH concentration. Extracts and fractions were screened for their total anthraquinones, phenols, tannins, gallotannins, oligomericprocyanidins (OPC), flavan-3-ols, and for antioxidant activity by DPPH and P-Mo assays. OPC-enriched fractions were qualitatively analyzed by LC-ESI-MS. The major compounds were represented by flavan-3-ol dimers (9

compounds) and trimers (2) and (-)-epicatechin-3-O-gallate. Dimeric OPCs were also present as galloyl or digalloyl esters. Sequential elution of the Amberlite XAD4 or XAD16 resin bed allows separating different classes of tannins and yields highly purified fraction, without detectable anthraquinones, having superior antioxidant activity, rich either in OPC, flavan-3-ol monomers, or gallotannins. *Hydrolapathi radix* is an excellent source of polyphenolic antioxidants, superior to the other common European dock species due to the low anthraquinone levels.

PP-145

ANTICANCER ACTIVITY OF DICOMA ANOMALA EXTRACTS

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The aim of the present study was to determine the anticancer activity of *Dicomaanomala* extracts. Methanolic, dichloromethane and aqueous extracts were tested for their growth inhibitory effects in vitro against three human cancer cell lines: breast cancer cells, MCF7; colon cancer, HCT116, and prostate cancer, PC3 using the Sulforhodamine B (SRB) assay. Extracts were classified into four categories based on their total growth inhibition of the cell lines. Extracts which exhibited a total growth inhibition (TGI) of less than 6.25 μ g/mL were regarded as potent. The aqueous extract was classified as inactive. The dichloromethane extract of *Dicoma anomala* exhibited moderate activity against the three cell lines. So evaluation of *Dicoma anomala* in the prevention and treatment of cancer is recommended. The isolation of active ingredients from these extracts is suggested

PP-146

EFFECT OF AQUEOUS EXTRACTS FROM THE LEAVES OF ARTEMISIA ABSINTHIUM AND A. ALBA IN THE MOUSE-PAW OEDEMA INDUCED BY CARRAGEENIN

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Artemisia genus is widely used in traditional medicine in Algeria for the treatment of many diseases such as cancers and inflammation. The inflammation is process used to eliminate the pathogens and repair tissue damage.

We have tested the anti-inflammatory activity of the aqueous leaf extracts of 2 species of *Artemisia* (*A. absinthium* and *A. alba*) in mice weighting 25±5g. We administered *per os* either vehicle (control group), the aqueous leaf extracts (200mg/kg) or diclofenac (50 mg/kg) 60 min before an edema was induced in the mice paw by subcutaneous injection of carrageenan. The mouse-paw volume was measured 1h, 3h and 6 h after injection of carrageenan. In control group, the carrageenan increases the development of edema of the mouse-paw by 52.84±9.64%, 36.97±6.88% and 22.94±9.84% respectively at 1h, 3h and 6h. The Diclofenac at a dose of 50 mg/kg, paw volume was reduced significantly by 36.40±6.66%, 36±2.04% and 20.80±7.54% at 1, 3 and 6 hours respectively. At 200 mg/kg dose of the aqueous extracts of *A. absinthium* significantly inhibited the development of edema specially after 6 hours (22.38±6.57% compared to 43.93±12.02 and 30.00±12.37% at 1h and 3h respectively). Similar results were observed with the aqueous extract of *A. herba alba* but the inhibition was significantly noted at after the first hour (65±8.31% compared to 10, 1.87 % and 27.47±2.00% at 3h and 6h, respectively). These results show that promising therapeutic use of these 2 plants to prevent the inflammatory process.

PP-147 EXTRA VIRGIN OLIVE OIL COMPONENTS, OXIDATIVE STABILITY AND ANTIOXIDANT ACTIVITY FROM WILD OLIVES GROWN IN BEJAIA

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Virgin olive oil, one of the main components of the Mediterranean diet, is highly appreciated all over the world for its delicious taste and aroma, as well as for its beneficial nutritional properties. With the aim to select new olive with superior physical and chemical properties, the present study focused on the determination of the phenolic compounds, fatty acids composition, oxidative stability and antioxidant activity of oils extracted from some wild olives growing in the province of Bejaia. Our results showed significant differences in the analytical parameters examined confirming the importance of genetic factors in the chemical characteristics of the oil. The results of the analysis of individual phenolic compounds performed by HPLC indicate a similar qualitative composition between wild olive oils. The main phenolic compounds determined are: oleuropein derivatives (43.8 to 228.1 mg/kg), ligstroside derivatives

(52.4 to 369.9 mg/kg), flavonoids (3.12 to 13.3mg/kg), lignans (10 to 57mg/kg) and elenolic acids (66.7 to 168.3mg/kg). The fatty acid composition is well within the IOOC standard with the predominance of oleic acid (67.5 to 78.23%). The antioxidant capacity and oxidative stability of samples follows the same order as that of the levels of polyphenols. The wild olives produce oils with good quality characteristics in terms of natural antioxidants and antioxidant activity.

PP-148 ON-LINE SCREENING AND IDENTIFICATION OF ANTIOXIDANT PHENOLIC COMPOUNDS OF *SACCOCALYX SATUREOIDES* COSS. ET DUR.

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Saccocalyx satureoides Coss et Dur is an endemic species using in folk medicine in Septentrional Sahara. In this study, the chloroform, ethyl acetate and the *n*-butanolic soluble part of the hydroethanolic extract (8:2) of the species was evaluated for the antioxidant activity based on the results of 2,2'-azino-di (3-ethylbenzothiazoline-6-sulfonic acid (ABTS⁺). On line HPLC-ABTS was applied to screen the extracts and subsequent fractionation followed by spectroscopic analysis (HRMS, UV, NMR: ¹H, ¹³C, COSY, NOESY, HSQC and HMBC) to identify free radical scavengers in *Saccocalyx satureoides*. Nine compounds were identified: balanophonin an unusual neolignan, 3,3'-bis(3,4-dihydro-4-hydroxy-6,8-dimethoxy-2H-1-benzo-pyran, 3,3'-bis(3,4-dihydro-4-hydroxy-6-methoxy-2H-1-benzo-pyran, 5-hydroxy-2-(4-hydroxy-3-methoxyphenyl)-6,7,8-trimethoxy-4H-chromen-4-one, 5,8-dihydroxy-2-(4-hydroxy-3-methoxyphenyl)-6,7-dimethoxy-4H-chromen-4-one, quercetin, ferulic aldehyde, vanillin and ethanone, 1-(4-hydroxyphenyl). These compounds were dominant free radical scavengers in the species and their trolox equivalent antioxidant capacity (TEAC) was determined. Vanillin, ethanone, 1-(4-hydroxyphenyl), ferulic aldehyde and balanophonin were the most potent antioxidants (TEAC: 0.25; 0.24; 0.40 and 0.83 µg/ml respectively). All these compounds were described for the first time in *Saccocalyx satureoides*.

PP-149
NEW IRIDOIDS AND OTHER CONSTITUENTS
FROM *GAILLONIA REBOUDIANA*

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As a part of our ongoing program of research of new molecules with potential biological activity from Saharian species, we report our results on *Gailloniare boudiana* Coss. et Dur., syn: *Choulettiare boudiana* Pomel, a low endemic shrub present at the septentrional and the western Sahara, on which no previous phytochemical study has been carried out. The present work which concerned the chemical constituents of the chloroform and methanol extracts of the leaves and flowers of this species led to the isolation of 21 compounds from which: 2 new iridooids together 6 known iridooids, 3 steroids, 6 triterpenoids and other constituents. All the structures were identified by spectral analysis, mainly HR-ESI-MS and 2D NMR (COSY, NOESY, HSQC, HMBC) as well as by comparing their spectroscopic data with those reported in the literature.

PP-150
THE DEVELOPMENT OF TROPICAL
ANTIMICROBIAL PRODUCT FROM HERBAL
OILS

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The aim of this research project is to develop the prototype of external used antimicrobial formulations from the oils of fresh leave sheathes of lemongrass (*Cymbopogon citratus*), rhizomes of galanga (*Alpinia galanga*) and seeds of custard apple (*Annona squamosa*). The oils were blended together and evaluated for the best synergistic antimicrobial activity against various pathogenic microorganisms caused atopic dermatitis with the lowest toxicity and the best stability. The

minimum inhibitory concentration (MIC, %v/v) and minimum bactericidal concentration (MBC, %v/v) of lemongrass, galangal, and custard apple oils were determined by broth microdilution method. The lemongrass oil exhibited MIC (MBC) against *Staphylococcus aureus* at 0.5% (0.5%), *S. bovis* at 0.125% (>4%), and *P. aeruginosa* at 40% (40%), respectively, and showed MIC (MFC) at 0.25% (0.25%). The galanga oil expressed the MIC (MBC) against *S. aureus* at 4% (>4%), *S. bovis* at 0.5% (>4%), and *P. aeruginosa* at >40% (ND), respectively, and showed MIC (MFC) at 0.5% (>4%). The custard apple oil possessed the MIC (MBC) against *S. aureus* at >10% (ND), *S. bovis* at 40% (>40%), and *Pseudomonas aeruginosa* at 10% (ND), respectively, and exhibited MIC (MFC) at >10% (ND). The combination profiles of galanga with lemongrass and custard apple oils (volume ratios 7:3:0, 1:1:0, 3:7:0, 3:6:1, and 3:5:2) were tested against four pathogenic microorganisms. Synergistic activity was best noted for only one ratio (volume ratio 3:7:0) as the $\Sigma_{fic} < 1$ against all tested microorganisms. The cytotoxicity of lemongrass oil evaluated by MTT reduction method depended on the concentrations being used and the exposed time. Results of the present investigation provided evidence that the utilization of two essential oils of galangal and lemongrass combination could be assessed for synergistic antimicrobial activity in order to reduce their minimum effective dose. This should lead to effective application of the spice extracts as natural antimicrobial agents. The 1%w/w of combined oils at the volume ratio of 3:7:0 was used to prepare the solid lipid nanoparticles (SLNs) and tested for its antimicrobial activity against the pathogenic microorganisms by agar well diffusion compared with the ratio 3:6:1. The result showed that the 3:7:0 SLNs exhibited better antimicrobial activity than the 3:6:1 SLNs against *S. aureus*, *S. bovis*, *Candida albicans*, and *Trichophyton mentagrophytes* by showing larger diameter of inhibition zone while both of the SLNs possessed no antibacterial activity against *P. aeruginosa*. This observation was strongly suggested that the best antimicrobial combined oils ratio for the treatment of atopic dermatitis and dermatophytosis was 3:7:0. The 3:7:0 SLNs was used to prepare the prototype of ointment and cream for external used antimicrobial formulations against atopic dermatitis and dermatophytosis. The freshly prepared ointment and cream were white, rich in aroma, and being stable after kept for 3 months at room temperature. It could be concluded that the products were suitable for being used as the antimicrobial formulations against atopic dermatitis and dermatophytosis.

PP-151 EVALUATION OF PROPOLIS EFFECT ON LIVER AND KIDNEY FUNCTIONS IN RATS

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Propolis is strongly adhesive, resinous substance collected and used by bees to seal holes in their honeycombs, smooth out the internal walls and protect the entrance against intruders. Propolis has been used as traditional remedy for various diseases and as health food. Several biological properties of propolis including tumor cell arrest, antibiotic, antioxidant, anti-inflammatory have been reported. The ethanolic extracts of propolis have been investigated most extensively, and various effects of these extracts have been demonstrated. The present study was undertaken to evaluate the possible toxicity and side effects of ethanolic extract of propolis. The effect of oral administration of 300 mg/kg b. wt of propolis on liver and kidney functions and body weight gain was evaluated in rats. Liver function was evaluated by measuring the serum activity of aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase, total bilirubin and cholesterol. Serum concentration of creatinine and urea were determined as colorimetric. Propolis extract did not cause any mortalities or sign of toxicity in rats. The tested extracts did not produce any significant change in liver and kidney functions of rats. Moreover our results show a sedative and diuretic effect of propolis.

PP-152 USING AS AN ANTIOXIDANT RESOURCE IN FOOD OF INDUSTRIAL WASTE OF GARLIC SKINS

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Garlic skins have not been studied for their health benefits because they are not an edible part of garlic. According to the few reports on the chemical composition of garlic

skins, the characteristic constituent in garlic skins is pectin. Also, enzymatic hydrolysate of garlic skins contained *p*-coumaric acid, ferulic acid, and sinapic acid was reported. An investigation of the composition of garlic skins showed the presence of proteins, lipids, lignin, mannitol, pectin and polysaccharides. According to the other research, 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity of garlic skin extract was evaluated and the researchers found that garlic skin extract had a strong DPPH radical scavenging activity, and six phenylpropanoid derivatives were identified as the primary antioxidant constituents from the extract. This developed method has simple manufacturing technique and suitable for industrial production of garlic of garlic skin and the comparing and useful ingredients when it is edible for human body and promote metabolism function of enhancing immunity of human body preventing cardiovascular disease and garlic basically equal effect of the invention is a good substitute garlic.

PP-153 CYTOTOXICITY EVALUATION BY BRINE SHRIMP (*Artemia salina* L.) LETHALITY BIOASSAY ON SOME *CRATAEGUS* L. (HAWTHORN) TAXA FROM TURKEY

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The medicinal use of extracts prepared from plant parts of the genus *Crataegus* dates back to ancient times. In this study, cytotoxic properties of two *Crataegus* taxa were studied for their cytotoxicity using brine shrimp (*Artemia salina* L.) lethality test. The extracts (ethanol) obtained from fruits of *C. aroniavar.dentata* and *C. monogyna* subsp. *monogyna*. *Artemia salina* eggs were incubated in 500 mL of seawater under artificial light at 28°C, pH 7-8. After incubation for 24 h, nauplii were collected with a Pasteur pipette and kept for an additional 24 h under the same conditions to reach the metanauplii stage. Ten nauplii were drawn through a glass capillary and placed in each vial containing 4.5 mL of brine solution. In each experiment, 0.5 mL of the plant extract was added to 4.5 mL of brine solution and maintained at room temperature for 24 h under the light and surviving nauplii were counted. For all the extracts used in screening process brine shrimp lethality was recorded after 24 hours by using overhead projector. The percentage of lethality was calculated from the mean death shrimp larvae of extracts

treated tubes and control. LC₅₀ values were calculated by Probit Analysis Program. We found that the ethanolic fruit extracts of *C. monogyna* subsp. *Monogyna* exhibited higher cytotoxic activity than *C. aroniavar.dentata*.

PP-154 BROOMS OF TURKEY

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Brooms are used for cleaning purpose as well as for various cultural practices, beliefs, traditions and rituals in Anatolia. In many parts of Turkey, especially in rural areas, plants in the forms of shrubs and herbs are grouped and bound together to meet the daily needs of local people like cleaning yards, houses, streets and barns and to be used as amulets and knickknackeries. Furthermore, it is also known that there exist several practices relating to brooms in rites of passage like birth, marriage and death, beliefs on certain days, doing the honors, folk meteorology and folk medicine. The aim of this study is to document the plant used as brooms in Anatolia. The study was carried out from 2003 to 2013. Samples of each broom were collected from twentyfive cities of Turkey (Adana, Ağrı, Antalya, Ardahan, Artvin, Aydın, Balıkesir, Batman, Denizli, Gaziantep, Hatay, İzmir, Kars, Kayseri, Konya, Malatya, Manisa, Mardin, Mersin, Muğla, Şanlıurfa, Trabzon, Van, Yalova, Zonguldak and Girne, KKTC). The collected samples are stored in Ege University Botanical Garden and Herbarium Research and Application Center, İzmir. The information about local name, used parts, place of use, description of the plants was gathered by interviewing with local people. It was identified that 51 plant taxa belonging to 25 different families were used as brooms. Scientific names of the plants, the families they belong to, their local names, life forms, used parts, status (wild or cultivated), place of use and places where they are collected are listed in a table. Compositae is the largest family represented by eight species used as brooms. It is followed by Dipsacaceae with seven species and by Polygalaceae with four species. The most common specie is *Osyris alba*. Recently, the use of handmade brooms is rapidly disappearing. The major reason is that, along with the technological development, vacuum cleaners and plastic brooms has been sitting for handmade brooms. On the other hand, particularly in rural areas, plants are still used as brooms by local people and broom making craft continues its existence even if decreasingly. In this context, this study has been carried out for documenting the last findings of a tradition which is dying out.

PP-155 ETHNOBOTANICAL USES OF HYACINTHACEAE FAMILY IN TURKEY

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Turkey is one of the most floristically rich countries in the world with astonishing plant diversity. Its flora consists of about 10.000 vascular plants and approximately one third of its flora (34.4 %) is endemic to the country. Turkish people are quite interested in wild plants, due to the high proportion of people living in rural areas, and also for economic reasons. The Hyacinthaceae family is bulbous plants. In Turkey, Hyacinthaceae family is represented 9 genera (*Urginea*, *Scilla*, *Chionodoxa*, *Puschkinia*, *Ornithogalum*, *Muscari*, *Hyacinthus*, *Bellevalia*, *Hyacinthella*) and 140 taxa of which 77 are endemic to Turkey, especially species of Hyacinthaceae family, have generally been used for the treatment of rheumatism, cardiac, urinary infection, dermatological, stomach, haemorrhoid and prostate. This study is review of the Hyacinthaceae family having traditional usage by local people in Turkey. Widely used species are as follows, *Bellevalia forniculata*, *Bellevalia pycnantha*, *Bellevalia sarmatica*, *Hyacinthus orientalis* subsp. *chionophilus*, *Muscari armeniacum*, *Muscari bourgai*, *Muscari comosum*, *Muscari macrocarpum*, *Muscari muscarimi*, *Muscari neglectum*, *Muscari tenuiflorum*, *Ornithogalum armeniacum*, *Ornithogalum narbonense*, *Ornithogalum oligophyllum*, *Ornithogalum platyphyllum*, *Ornithogalum pyreniacum*, *Ornithogalum sigmoideum*, *Ornithogalum sphaerocarpum*, *Ornithogalum umbellatum*, *Puschkinia scilloides*, *Scilla bifolia*, *Scilla siberica* subsp. *armena*, *Urginea maritima*. The locations, vernacular names, used parts and traditional use and administration of the species will be explained in detail.

PP-156 BOTANICAL CONSERVATION OF THE ENDANGERED MEDICINAL PLANT SPECIES OF THE HIMALAYAS

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The plant biodiversity is the source of food, timber, shelter substance, fuel, ethno-medicines and number of other utilizations for millions of people. Furthermore, continuity of agricultural crops depends upon the natural and wild flora of mountain regions which are responsible

for the overall function and regulation of lowland ecosystems. Plant biodiversity is also vital for lessening the impacts of climate change and global warming. In mountain ecosystems a number of endangered plant species are on the verge of disappearance from their native habitats, especially because of their narrow ecological amplitudes. The loss of diversity is often attributed to anthropogenic activities. Although some species are resilient to environmental modification and have a long history of cultural interaction, others are more fragile and cannot be recovered if once destroyed. Proper documentation and IUCN criteria can be assigned to plant species in mountain ecosystems. Bringing sustainability into the use and management of non-timber forest products (NTFPs), and especially medicinal plant (MPs) collection in the Himalayas and other adjacent mountains, is a challenging task. Haphazard and uncontrolled collection of these plants has, however, caused increasing rarity of some of these species, many of which are now critically endangered and threatened. The marketing of these medicinal plant species, rather than just direct use, further worsens their conservation status. In the scenario of possible future continuation of anthropogenic and climate driven alterations to ecosystems, proper assessment of plant biodiversity and of conservation priorities need to be ensured. For this purpose rare and endangered medicinal species of the Himalayas can be targeted by bringing them to botanical gardens for their future preservation and conservation.

PP-157
ESSENTIAL OILS FROM *DAUCUS SAHARIENSIS*
(APIACEAE) GROWING IN ALGERIA

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Daucus species have been intensively studied mainly for their essential oil contents. It was observed to be the richest genus of the Apiaceae in essential oil. This work aims to study the chemical composition of the essential oils of *Daucus sahariensis* (Apiaceae) growing in Saharan territory. The essential oils were obtained by hydrodistillation using Clevenger type apparatus from leaves and fruits of *Daucus sahariensis* Murb. The oil was analyzed by Gas chromatography-mass spectrometry (GC/MS). The main constituents of the essential oil from the leaves were myristicin (34.3%), α -pinene (5.4%), *cis*-

chrysanthenyl acetate (5.3%) and *epi*- α -bisabolol (4.8%), and those from the fruits myristicin (43.9%), α -pinene (13.1%), limonene (9.4%), and *cis*-chrysanthenyl acetate (7.4%). Myristicin, the main constituent of both essential oils, is generally absent in the oils from other *Daucus* species, permitting the hypothesis that this compound is a chemical marker of this Saharan species.

PP-158
POPPY AGRICULTURE IN TURKEY: FROM PAST TO PRESENT

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Papaver somniferum L. (poppy) is an annual cultivation plant. Poppy is cultivated in Turkey and also in other countries such as India, Japan, China, Australia, France, Spain, too. Our country is considered as the traditional poppy producing country and also is the second country after India for poppy production in the world. It is cultivated in Central Anatolia and the Black Sea region and Uşak, Denizli, Eskişehir, Kütahya, Isparta, Konya, Burdur and mostly Afyonkarahisar provinces in Turkey. Seeds and capsule barks of poppy plants are utilized for feeding. Young and fresh leaves of this plant are being consumed as salads and plant residues are used as a fuel. Seeds of this plant are used as pastry and cooking oil in Turkey. Morphine is produced from opium barks and milk and also is utilized in the medicinal field. Poppy based on the past far to Mesopotamian was used as painkiller in that time but it is used in medicine, the food industry, cosmetics and paint industry at the present time. In our country, controlled poppy agriculture is done two times per year in 700.000 dears and capsules are collected by Soil Products Office. Poppy is an important agricultural product for Turkey and contributes to Turkey's economy with its exportation. In this research, we arranged a visit to Opium Alkaloids Factory which was established with the aim to obtain alkaloids from unscratched capsule and obtained some information about the functioning of the factory, cultivation of poppy by the public and poppy agriculture from past to present. Interviewed with the public who cultivate opium and put forwarded the differences between cultivation. And also, the differences between subspecies of *P. somniferum* using in agriculture was proved.

PP-159

STUDY OF MEDICINAL *ALLIUM PARADOXOM* POPULATIONS in HYRCANIAN FORESTS, NORTH OF IRAN

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Allium paradoxom grows in Iran's Northern forests in spring and put on the market as a wild vegetable. The existence of this species is in danger because of irregular reaping. Our object is surveying the diversity of this plant in its main environment and also compares the percentage of cover of *A. paradoxom* in restricted forests with unrestricted forests. So, 10 transect with 100 meters length and 1 meter width was chosen and used 1*1 plots in each transect. In the plots, number and cover percentage of the plant and some studies such as soil experiments and effects of environment were surveyed. Reaping the plant in addition to having influence on its cover would have influence on reproduction of it and *A. paradoxom* would incline for vegetative reproduction by bulb and bulbil. The relation of cover and restriction of forests surveyed by ANOVA technique with $\alpha=0.05$. The result of variance analysis became P-value=0.429. This P-value shows that there is not a significant relation between cover percentage and restriction of forests; it means that the restriction factor is not effective on cover amount. This survey repeated for each forest in comparison with other forests that this time P-value became less than 0.05 meaning that there is a significant relation between forest factors and cover percentage of each forest. It means that ecological factors like height of forest and soil would have influence on *A. paradoxom*'s cover amount refers to PCA and ANOVA analysis, organic carbon and amount of organic substance of soil have the most influence on amount of cover.

PP-160

TRADITIONAL FOLK KNOWLEDGE IN THE BUENAVISTA BIOSPHERE RESERVE, CUBA

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Traditional folk knowledge has always been a reliable source for scientific research or at least a somewhat dependable start for future investigation. Interviews were carried out in the Buenavista Biosphere Reserve, Cuba for the first time and traditional folk knowledge was compiled with emphasis on valuable and promising species for the social and economic development of folk communities. Expeditions, localization and characterization of communities were carried out as well as environmental education activities and ethnobiological interviews for 42 months (2009-2012). Results show a total of 527 products and 3 services given by forests (protection of biological diversity, recreation and tourism). The most represented categories were food (135 products) and medicine (110). According to uses, ornamentals (142), medicinal products (104) and ornamental and/or charismatic animals (56) were the most represented. The most significant NWFP are: bee honey, medicinal plants, royal palm leaves (*Roystonea regia*), wild animal's meat, fiber of guaniquique (*Trichostigma octandrum*) and raíz de China (*Smilax havanensis* and *Smilax domingensis*); these last three species are harvested in an unsustainable way. Anthropogenic actions affecting vegetation units are: fire, extraction of fibers for craftsmanship purposes and medicines, selective felling and uncontrolled felling. As a result of this research, 81 native species are proposed for reforestation planning and reserve management. Activities of environmental education and communication were implemented for the conservation and sustainable use of forest resources. Results were obtained under the frame of the project "Productos Forestales No Maderables (PFNM) en la Reserva de la Biosfera Buenavista" (Code DB 045), Programa Ramal de Diversidad Biológica.

PP-161
DETERMINATION OF ELLAGIC ACID AND RESVERATROL IN BLUEBERRY SAMPLES GROWN IN TURKEY

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Epidemiological studies suggest that consumption of fruit and vegetables contributes to a reduced risk of certain types of human cancer and cardiovascular diseases. Berries types fruits are popular because of their good taste and well-known nutritional value. *Vaccinium* berries such as blueberries (*Vaccinium corymbosum* L.) contain high amounts of sugars and acids as well as phenolic compounds that display potential health-promoting effects. Furthermore blueberries are grown in large scale in Black Sea Region of Turkey and they are currently being promoted as a rich source of antioxidants. Ellagic acid and Resveratrol have also been detected in some blueberry cultivars. Interest in ellagic acid and resveratrol has increased during the past decade due to their possible antimutagenic, anticarcinogenic, and antioxidative effects. In this study, a chromatographic method was developed for ellagic acid and resveratrol by high performance liquid chromatography and diode array detector. Four different blueberry varieties, grown in the Black Sea Region of Turkey, (Bluecrop, Brigitta, Darrow and Bluejay) were analyzed first time for ellagic acid and resveratrol determination. According to developed method, we achieve good separation and resolution for ellagic acid and resveratrol in blueberry. Chromatographic conditions; mobile phase: 5 mM Potassium dihydrogen phosphate / ACN and gradient elution was used. Column: Luna ODS-2 RP- C18 (5µm, 4.6 ×250 mm i.d.), Detector: DAD Detector, Wavelength for Ellagic Acid λ: 260 nm, for resveratrol λ: 310 nm (Band width: 4 nm), Flow Rate: 1 mL/min., injection volume: 20µL, pressure: 162 bar. HPLC method developed in this study can assist for determination of the amount of phenolic acids in fruits and the findings will be useful for cancer research on blueberries.

PP-162
THE MEDICINAL PLANTS USED AROUND THE WORLD HERITAGE SITE MOUNT NEMRUT, ADIYAMAN (TURKEY)

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The main object of the study was to document the traditional knowledge on the use of medicinal plants around Mount Nemrut which was made a world heritage site by UNESCO in 1987. A field study had been carried out for a period of 2 years (2012-2013) in 18 villages. Information was obtained from personal conversations and guided fieldtrips with 44 informants. Data on medicinal uses of 85 taxa, belonging to 34 botanical families, were obtained and presented. Most frequently recorded families were Labiatae (13), Asteraceae (10) and Rosaceae (10) and plants were *Rheum ribes*, *Juglans regia*, *Pistacia terebinthus*, *Morus nigra*, *Alcea aptera carpa* and *Mentha pulegium*. The respondents of the questionnaire were mostly Kurdish ethnic backgrounds and local names of the plants were also reported.

PP-163
DEVELOPMENT OF COSMETIC PRODUCT FOR ACNE AND MELASMA FROM *EMBLICA* EXTRACT

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Emblica (*Phyllanthus emblica* Linn.) is medicinal herb that mostly found in Asia, especially in Thailand. Its fruits contain high levels of vitamin C and gallic acid which act as anti-acne, anti-melanin and anti-wrinkle. The present study aimed to determine the biological activities of *Emblica* extract including the tyrosinase inhibition by dopachrome method, the antibacterial activity against the pathogenic bacteria by agar dilution method, and the antioxidant activity by DPPH radical scavenging. The result showed that *Emblica* extract inhibited the tyrosinase enzyme with IC₅₀ value of 221.5 µg/mL. Furthermore, the *Emblica* extract also exhibited the antibacterial activity against *S. aureus* with MIC of 122 µg/mL, and the antioxidant activity with IC₅₀ of 14 µg/mL. Formulation of *Emblica* foundation cream was then developed. Stability testing of six heating-cooling cycles at 4°C and 45°C was determined. The foundation cream was stable under the accelerated conditions. Irritation study indicated that the cream was non-irritate and safe for consumer.

PP-164 VIEWPOINT ABOUT MEDICINAL PLANTS IN KIRKLARELI PROVINCE

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The using of plants have been known that as old as the beginnings of the humanity. People used the plants as food in the old times. In addition, the people have been looking for drugs in nature for their diseases since very ancient times. The beginning of the use of medicinal plants emerged instinctively, like animals. It is known fact that plants are extremely useful for people. Our ancestors did not know how to treat illnesses, which plant and how it could be utilized as a treatment. All of about the plants have been based on experiences. In this study, a questionnaire about the medicinal plants was applied the people of Kırklareli province. About two hundred fifty people (different genders, ages and professions) replied the survey. In addition, the youngest and the oldest people are eighteen and seventy five years old, respectively. The questionnaire consists of ten open-ended questions. And these questions intended to measure of people's viewpoint about medicinal plants and herbal treatment. It is seen that people have some information about medicinal plants but this information is mostly from hearsay. Medicinal drugs are mostly accepted more helpful than medicinal plants because of taking medical supervision. But on the other hand, because of the drugs have some chemical substances; they are thought to be less healthy. Nevertheless, medicinal drugs are more preferred due to the known effects for healing. People do not exactly know the effects of the medicinal plants.

PP-165 ANTIOXIDANT ACTIVITIES OF SOME MEDICINAL PLANTS IN KIRKLARELI PROVINCE (TURKEY)

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Urtica dioica L. (Urticaceae), *Achillea millefolium* L. subsp. *pannonica* (Schelek) Hayek (Compositae), *Malva sylvestris* L. (Malvaceae), *Melissa officinalis* L. subsp. *officinalis* (Labiatae), *Cotinus coggyria* Scop. (Anacardiaceae) and *Plantago major* L. subsp. *major*

(Plantaginaceae) are used in traditional medicine for the treatment of several ailments such as wounds, cold, cough, diabetes, stomach and kidney diseases in Kırklareli Province (Turkey). The present study was conducted to evaluate the antioxidant activities of ethyl acetate, methanol, dichloromethane and petroleum ether extracts of above mentioned plants. Total phenolic and flavonoid contents, ferric ion reducing antioxidant power (FRAP) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging activities of the extracts were analysed for the determination of the antioxidant capacities. Among the fractions obtained from different plants, both highest phenolic content and antioxidant activity were found for the ethyl acetate and methanol fractions, followed by dichloromethane fraction, while petroleum ether fraction showed no detectable antioxidant activity. *Cotinus coggyria* and *Melissa officinalis* subsp. *officinalis* showed the higher antioxidant activities than other plants. Usage as traditional medicine of these two plants probably related to their potent antioxidant activity.

PP-166 GENETIC AND CULTURAL DIVERSITY OF TRADITIONAL BUCKWHEAT LANDRACES

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Buckwheat, a traditional food crop, covers common buckwheat (*Fagopyrum esculentum*) and tartary buckwheat (*F. tataricum*). It is now cultivated in Asia and Europe extensively. Buckwheat still plays an important role in the nutrition and culture in many Chinese groups, including Yi, Lisu, Daur, Mongol, Korean, Tibetan and Han. Tartary buckwheat is very popular in the celebration activities of Yi people. The Korean's cold noodles, with a long history, unique and complicated preparation, are made from buckwheat. In Daur, it has become a unique folk custom and tradition to prepare Daur food. Buckwheat is the oldest cultivation crop in the Tibet Plateau. At present about 18 species, 2 subspecies and 2 forms of the genus have been identified and named worldwide. Most of them are distributed in China's Yunnan Province. In particular, *Fagopyrum dibotrys*, an important traditional Chinese medicine and ethnomedicine, has been listed as the state protected species. Yunnan is not only the center of the diversity of cultivated buckwheat germplasm resources, but also the center of wild *Fagopyrum*. Ohnishi has pointed northwest Yunnan might be the original place of *F. esculentum*, and the juncture areas of Yunnan, Sichuan and Tibet might be

the original place of *F. tataricum*. Buckwheat has a long history of cultivation in China and it is necessary to study intraspecific genetic diversity. However, there are still many arguments and disputes on the taxonomy of wild buckwheat. Thus, DNA molecular markers have been used to identify the genetic diversity of buckwheat.

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DETERMINATION OF MEDICINAL WEED SPECIES IN ISPARTA PROVINCE, TURKEY

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According the results of survey which was conducted in 378 different crop production areas in the province of Isparta, Turkey, in a three-year-period, 306 weed species were identified and 99 of these species to be used for medicinal purposes that derived from various literatures. Within the identified medicinal species there are 59 diuretic species, 19 tonic species, 17 tranquilizer species, 15 vulnerary species, 15 mucolytic species, 13 antifebrile species, 13 sudorific species, 12 purgative species, 12 aperitif species, 12 anthelmintic species, 9 sedative species, 8 analgesic species, 7 antihemorrhagic species, 7 digestive species, 7 antispasmodic species, 6 cholagogue species, 6 antiseptic species, 5 antifatulent species, 5 emmenagogue species, 5 depurative species, 4 antitussive species, 4 stimulant species, 3 narcotic species, 2 hypotensor species, 2 emetic species, 2 choloretic species, 2 antidiabetic species, 2 antineuralgic species, 1 aphrodisiac species, 1 antilithic species, 1 hypnotic species, 1 vasoconstrictor species, 1 antiasthmatic species. Many of these species have more than one therapeutic feature. The most notable species are *Hypericum perforatum* L., *Cichorium intybus* L., *Rumex acetocella* L., *Eruca sativa* Miller, *Cyperus rotundus* L. and *Elymus repens* (L.) Gould. in terms of therapeutic use. *Phlomis armeniaca* Willd is one of the weed species, which used for medicinal purposes, is endemic for Turkey and it is used as stimulant. Asteraceae family with 15 species was found the biggest family in terms of number of species with medicinal properties. Part of the identified species is still used in rural areas for therapeutic purposes with traditional methods.

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THE EDIBLE PLANTS DATABASE OF TURKEY

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The collocation of the Turkish Flora, hosting more than 11.500 taxa with one third of which are endemic, and the Anatolian culture with a history dating back to 11.000 BC, is a huge potential in terms of natural food resources. Our study intends to prepare an extensive “database of edible plants” by scanning all the scientific sources about the Turkish Flora, in particular the ethnobotanical studies that have been revealed up to today. Since the databases are sources which can be constantly updated and improved with new functions, their importance as modern and remotely accessible devices will remain in the future. Our database includes the local names of plants used for food purposes located in the *Flora of Turkey*, their locations, the parts that are used, their use preparation forms and the literature where this information is given. The plants recorded have been discussed in 16 main categories, considering their usage pattern. Our database relations schema has been established with Microsoft Visual Studio 2008, prepared with SQLite and designed to provide data on the internet. In our study so far, the content of 445 ethnobotanical researches featuring plants of Turkey and their plant lists have been scanned and recorded. Over time, this database will develop with new additional data and functions such as photos, chemical composition, nutritional value, toxicity, interactivity, warnings and will provide significant contribution to a comprehensive presentation of information to those who carry out researches in this field. It is assumed that the presented data will contribute to many disciplines such as botany, agriculture, nutrition, food industry, health sciences, toxicology, forensic science, history, archeology, and archaeobotany.

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TRADITIONAL HERBAL REMEDIES USED FOR DIGESTIVE TRACT PROBLEMS BY THE LOCAL COMMUNITIES OF KAGHAN VALLEY, MANSEHRA, KPK, PAKISTAN

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Studies from Bar and Shinaki Valleys, Northern Areas of Pakistan have revealed that 22% of plants were used by the locals for gastro-intestinal troubles, followed by 11% of the medicinal plants for bronchial and pulmonary ailments. Pakistan is blessed with a variety of wild plants which are being used for medicinal purposes. The properties and

proper uses of some of these plants are well known at the community level and end users level, many have still to be explored for their medicinal values. In India about 160 phyto-constituents have been reported from 101 plants belonging to 52 plant families with antihepatotoxic activity. The research area Kaghan Valley is located in Northern Pakistan, District Mansehra of Khyber Pakhtunkhwa Province. The inhabitants of the Valley have always used medicinal plants for various ailments and have for a long time been dependent on surrounding plant resources. The area is basically occupied by the rural communities and seasonal nomads. The present study deals with documentation of medicinal plant species used for various digestive tract problems. A total of 56 plant species belonging to 35 angiosperm and 02 gymnosperm families were reported by local practitioners for the treatment of digestive tract problems like constipation, diarrhea, flatulence, heartburn, hemorrhoids, indigestion, nausea and ulcer. The prominent plant species include: *Achillea millefolium*, *Aconitum heterophyllum*, *Artemisia absinthium*, *Berberis lycium*, *Carthamus oxycantha*, *Dioscorea bulbifera*, *Fraxinus excelsior*, *Hyoscyamus niger*, *Paeonia emodi*, *Plantago ovata*, *Punica granatum*, *Thymus serpyllum* and *Viola odorata*.

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IMPACT OF GREEN TEA CONSUMPTION ON OXIDATIVE STRESS IN CARDIOVASCULAR PATIENTS

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There is increasing evidence for a protective effect of tea consumption against cardiovascular disease (CD). Lipid abnormalities and oxidative stress are frequent and represent an important factor involved in the development of complications related to the atherosclerosis. Although, green tea, an infusion prepared with the leaves of *Camellia sinensis* is particularly rich in flavonoids. This perfusion is widely used in traditional medicine in south of Algeria to treat many diseases. The study was performed in 100 Algerian subjects. We evaluated some parameters such as MDA, GSH, Glucose, TG, LDL and HDL which have an accurate relationship with

cardiovascular diseases. Analytical evaluations were performed after 3 month drinking 2-3 cups/day of green tea. The results obtained in the present study showed clearly that green tea consumption caused a significant reduction in serum levels of MDA and lipid parameters. It has been noticed that the antioxidant effect of green tea, contributed in the inhibition of the following phenomena: Peroxydation of lipids, inflammatory activation, membrane alteration, coagulation troubles and perturbation of lipoproteins metabolism particularly LDL. Regular consumption of moderate quantities of green tea seems to be associated with a small protection against coronary artery disease (CAD). Our data suggest that a moderate consumption (2–3 cups/day) of tea is “possibly” useful for cardiovascular risk reduction.

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AN ETHNOBOTANICAL STUDY IN GÖLHİSAR DISTRICT (BURDUR-TURKEY)-I

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Göhlisar is a district of Burdur province which is located on the foothills of the western Taurus Mountain range in South-west Anatolia and C3 square in grid system adopted by Davis, Flora of Turkey. Göhlisar has an extremely rich flora depending mainly upon its location at the junction of two phytogeographic regions; Mediterranean and Irano-Turanian. A wide variety of habitats (mountains, forests, lake) also contribute to the immense diversity of the flora. Göhlisar has also a deep cultural heritage; the ancient city Kibyra located at the North-west hills of the district was an important city with a multicultural population around 1st century BC, according to Strabo. Göhlisar is a precious source for ethnobotanical research with its unique phytogeographical location and cultural background. In this study, different settlements of Göhlisar were visited and ethnobotanical data including local names, part(s) used, methods of preparation and traditional usage of plants were collected from 42 informants who have different demographic features. The plant materials were collected and identified. The voucher specimens were deposited in the Herbarium of Hacettepe University, Faculty of Pharmacy, Ankara, Turkey (HUEF). It was determined that 52 taxa belonging to 27 families were used for various ethnobotanical purposes (28 as medicine, 11 as foodstuff, 9 as functional food, 2 as animal fodder, 1 as ornament, 1 as dyestuff) in Göhlisar. The botanical families with the highest numbers of utilized plant species were Lamiaceae, Asteraceae and Rosaceae.

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IN-VITRO ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF *BOERHAVIA PROCUMBENS* FROM WESTERN HIMALAYA, PAKISTAN

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The current study was aimed to investigate the antibacterial and antioxidant activities of crude extract from aerial parts of *Boerhavia procumbens* and to find out new biomolecules. Aerial parts of the plant were collected from various localities of Western Himalayan region of Pakistan. Methanolic crude extract was prepared. The extract was tested against the various pathogenic bacterial strains and also tested for his ability to neutralize the free radicals (DPPH, ABTS⁺), to scavenge the H₂O₂ and reduction of Mo (VI) to Mo (V). Methanolic crude extract of *Boerhavia procumbens* showed very good results to inhibit the bacterial growth against gram positive bacteria *Bacillus subtilis* (8.0±1 mm-23.0±0.577 mm of zone of inhibition) with highest MIC of 2.5 mg/ml among all tested bacterial strains. It also exhibited excellent antioxidant activity during phosphomolybdenum assay with IC₅₀=6.11 µg/ml, R₂= 0.9509, in comparison with standard drug Ascorbic acid (IC₅₀=4.78, R₂=0.92). Results were also promising in case of DPPH, ABTS⁺ and Hydroxyl radical scavenging activities. The antibacterial and antioxidant activities of methanolic crude extract of *Boerhavia procumbens* is probably due to the presence of high content of phenolic compounds. The contemporary

presence of these high activities in this plant may be a source of bioactive compounds with multifaceted activity.

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THE EFFECT OF DIFFERENT LEVELS OF DROUGHT AND SALINITY STRESS ON MORPHOLOGICAL FEATURES IN TWO MASS POPULATIONS OF CUMIN (*CUMINUM CYMINUM*)

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Given the importance of medicinal plants, lack of fertile lands, the quality and quantity of influential materials in medical plants being affected by genetic factors, climatic conditions of plant growth location, the quality of soil and water and also this issue that the first stage of life cycle of a flowering medicinal plant like cumin is germination stage; in this study the effect of salinity (0, 50, 100, 150 and 200 mill mol of NaCl) and drought stress (-0, -3, -5, -7 and -9 bars 6000 PEG) on germination features of two masses of cumin (Taybad and Torbatjam) were conducted under a factorial experiment based on completely randomized block design with four replications. The measured characters were fresh weight seedling, sodium and potassium percentage. The salinity showed a significant decrease of fresh/dry seedling weight and potassium percentage of seedling. A significant increase of sodium percentage up to 150 mill molar of NaCl percentage was observed and more than 200 mill molar, it was significantly decreased. Taybad seeds were more resistance again drought and salinity stress. In general, the seeds of cumin (*Cuminum cyminum*) were more sensitive to salinity compared with the drought.

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AOAC. 1990. Official Methods of Analysis. 15th ed. Association of Official Analytical Chemists, Arlington, VA.

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Nouri, L. K. and A. R. Hassan. 1973. Studies on soil fertility and fertilizers in Iraq. *Tech. Bull. No. 43.* Ministry of higher education and scientific research. Baghdad. Iraq.

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