The 3rd International Symposium on Medicinal Plants, Their Cultivation and Aspects of Uses
BeitZaman Hotel & Resort
Petra - Jordan
November 21-23/ 2012

Abstract Book
Sponsors

http://www.mohammadasfour.com
المملكة الأردنية الهاشمية
رقم الإيداع لدى دائرة المكتبة الوطنية
(2012/10/4010)
ISBN 978-9957-31-012-7
(ردمك) 7-012-31-9957-8

يتحمل المؤلف كامل المسؤولية القانونية عن محتوى مصنفه ولا يعبر هذا المصنف عن رأي دائرة المكتبة الوطنية أو أي جهة حكومية أخرى.
THE 3rd INTERNATIONAL SYMPOSIUM ON MEDICINAL PLANTS, THEIR CULTIVATION AND ASPECTS OF USES

BeitZaman Hotel & Resort
Petra - Jordan
November 21-23/ 2012

Abstract Book

Chairman: Dr. Mohammad Abu Darwish
Al-Balqa’ Applied University

Chief in Editor: Dr. Mohammad Abu Darwish
Al-Balqa’ Applied University

Editors: Ziad H.M. Abu-Dieyeh
Dr. Ezz Al-Dein Al-Ramamneh
Welcome

Dear Participants,

It is a great pleasure to welcome you on my own behalf, and on behalf of steering, and scientific committees of The 3rd International Symposium on Medicinal Plants, Their Cultivation and Aspects of Uses, as you are meeting here in the Red-Rose city of Petra; which is famous with its history and civilization. A city that was a commercial as well as a cultural center where caravans met to continue their ways from east to west. Today, we are here again for the third time, to meet these elite scientists and researchers, from different countries of the world. They came from famous universities, institutes, and research centers to present their result's researches in an old-renewable science (Plant Science). A science in which agriculture, pharmacy, medicine, and biology have interfered. By this, we confirm that humans and humanity are linked to the nature, craving to return to it, conserving it too. We also confirm that our scientific research will continue, deeping into the knowledge of medicinal plants -been cultivated, harvested, used, and studied in the laboratory- until being manufactured to various forms. It will be away to modernize the originality, and to originate the modernity.

This conference will deal with your various, scientific researches in medicinal plants in the following main topics: Using medicinal plants and their extracts in the pharmacological activities, Ethno-pharmacological studies, Using medicinal plants as food additives in food recipes, Quality control and standardization of its products, Their conventional and organic cultivation and Impact of cultivation on their biodiversity, Climate change and ethno-botanical sources, Ethno-veterinary and animal nutrition practices of medicinal plants, Using of their extracts as parts of integrated pest management programs, New approaches in bio-fuel production and their industrial utilization.

Outstanding eleven Keynotes speakers, who came from prestigious scientific institutes, will talk to us in order to enrich our conference with researches through their long-year's scientific research. This conference will create a great opportunity to communicate between participants; it is also a chance to exchange ideas and experiences, however, this chance will ease their future communication in order to hold new prospects of scientific co-operation.
This conference is a result of your participation, and the effort of members of steering, scientific, and executive committees. Not only this, it is also a result of partnership with public and private Jordanian as well as foreign institutions that contributed to success of the conference, like: Scientific Research Support Fund, Petra Development and Tourism Region Authority, The Housing Bank for Trade & Finance, DELASS for Natural Products, Jordan River Foundation, Aqaba International Laboratories (Ben Hayyan), VAPCO Company for Veterinary Medicines, Baraka Farms, Arab Federation of MAP, Pharmacognosy Communications, Ministry of Agriculture, Jordan TV, Ro'ya TV, Nature Middle East and Asfour Company. All thanks and appreciation is extended for you and them.

I would like to extend my thanks to the Presidency of Al- Balqa Applied University represented by its president Professor Nabil Shawagfeh for supporting this conference. Once again, I welcome you in the Hashemite Kingdom of Jordan. A country full of love, goodness and peace.

We wish you all a fruitful meeting.

Dr. Mohammad Sanad Abu Darwish

Al-Balqa' Applied University
Chairman of the Symposium
SCIENTIFIC COMMITTEE

- Mohammad Sanad Abu-Darwish (Chairman)/Al-Balqa' Applied University, Jordan
- Alain Meybeck / AM Phyto-Conseil, France
- Geoffrey A. Cordell / Natural Products Inc., Evanston.IL.USA
- Carlos Garbiso / Neiker-Tecnalia, Spain
- Hao Feng/University of Illinois at Urbana-Champaign, USA
- Caroline Weckerle / University of Zurich, Switzerland
- Ivan Salamon/Presov University, Slovakia
- Judit Hohmann /University of Szeged, Hungary
- Kyslychenko V.C. / National University of Pharmacy, Ukraine
- David Draper Munt / Universidad Politencica de Madrid, Spain
- Lígia Salgueiro/University de Coimbra, Portugal
- Fatma Afifi /Faculty of Pharmacy, University of Jordan, Jordan
- Mohammed Hmamouchi / AFAMP, Morocco
- Khulood Al Samarahrae/ Al Nahrain University, Iraq
- Rudolf Bauer / University of Graz, Austria
- Nasri Haddad / ICARDA, Jordan
- Wade Yang/University of Florida, USA
- Mohamed Rashwan Abdel-Aal/ Assiut University, Egypt
- Talal Ahmad Aburjai / Faculty of Pharmacy, University of Jordan, Jordan
- Abu-Dieyeh, Ziad H. M. / Al-Balqa’ Applied University, Jordan
- Bochra Laribi / National Agronomic Institute of Tunisia, Tunisia
- Abdelrahman Tawaha / Al-Hussein Bin Talal University, Jordan
- Bayan Abdulhaq / Amman Arab University, Jordan
- Ezz Al-Dein Al-Ramamneh / Al-Balqa’ Applied University, Jordan
- Faisal Awawdah / NCARE, Jordan
- Hashem Taha / Delass Natural Products, Jordan
- Kamal Khairallh/ Freelancer, Jordan
- Majed Hasanat / PDTRA, Jordan
- Mohammad Shahbaz / NCRD & IUCN, Jordan
- Taha M. Rababah/Jordan University of Science & Technology, Jordan
- Nemer Hadadin / Ministry of Agriculture, Jordan
- Oraib Nawash/ Royal Botanic Garden, Jordan
- Tariq Abo-Taleb/ Royal Botanic Garden, Jordan
- Muhammad H. Aludatt / JUST, Jordan
- Anwar Elhalah / Jordan River Foundation, JRF, Jordan
- Sobhia Saifan/ NCARE, Jordan

LOCAL ORGANIZING COMMITTEE

Honorary Chairman: Prof. Dr. Nabil Shawagfeh
Mohammad Sanad Abu-Darwish (Chairman)

Abu-Dieyeh, Ziad H.M.          AbedAlrzaq Shqirate
Ahmad Al-Fraiihat               Ashraf Al-Shaer
Eitaf Rawashdeh                 Ezz Al-Dein Al-Ramamneh
Khaled Al-Habahbeh              Odeh Murad
Omar Al-Bdoor                   Saddam Al-Dalain
Sati Al-Dalain                  Talib Al-Mseidein
Ziad Al-Rawashdeh
EXECUTIVE COMMITTEE

Chairman: Ziad H. M. Abu-Dieyeh

AbedAlrzaq Shqirate
Araf Rafaye'ah
Ahmad Bdawi Rafaye'ah
Aman Awadat
Doa'a Habahbeh
Ezdehar Shu'aibat
Hassaan Osofi
Heyam Shqirate
Khaleel Bdour
Majeda Aghawani
Mohammad A. Bdour
Mohammad H. Bdour
Mohammad R. Shqirate
Moneer Shqirate
Nora Hwartheh
Rakan Nasarat
Saleh Bdour
Somya Shkhibi
Talib Mseidein

Adel Marahleh
Ahmad Abbas
Ali Tawara
Bader Tawara
Ekhlas Dhayat
Fawaz Rafaye'ah
Haya Rafaye'ah
Khaled Habahbeh
Majed Hasanat
Marwan Habahbeh
Mohammad A. Rafaye'ah
Mohammad Khliiefat
Mohammad T. Bdour
Nedal Bdour
Odeh Murad
Reem Khoshman
Sohilah AboDarweesh
Tahani Bdour

TECHNICAL SECRETARIAT

Ekhlas Dhayat, Ezdihar Al-Shu'aibat, Tahani Bdour
INVITED SPEAKERS

Prof. Dr. Alain Meybeck / AM Phyto-Conseil, France
Prof. Dr. Fatma Afifi / University of Jordan, Jordan
Prof. Dr. Judit Hohmann / University of Szeged, Hungary
Prof. Dr. Jacobus Nicolaas Eloff / University Pretoria
Prof. Dr. Inteaz Alli / McGill University, Canada
Prof. Dr. Lyoussi Badiaa / University of Fez, Morocco
Dr. Matthias Lorenz / Phyto consult, Germany
Prof. Dr. Mohammed Hmamouchi / Arab Federation of MAP, Morocco
Prof. Dr. Rudolf Bauer / University of Graz, Austria
Dr. Caroline Weckerle / University of Zurich
Prof. Dr. Viljoen A. M. / Tshwane University of Technology, South Africa
1.1 Evaluation of the Volatile Oil Composition and Antiproliferative Activity of *Laurus nobilis* L. (Lauraceae) on Breast Cancer Cell Line Models

**Abu-Dahab, R., Kasabri, V., and Afifi, F.**
Faculty of Pharmacy, University of Jordan, Amman, Jordan.

**Abstract:** Volatile oil composition and antiproliferative activity of *Laurus nobilis* fruits and leaves grown in Jordan were under investigation. Volatile oil obtained by hydro-distillation was identified by GC-MS. Crude ethanol and other solvent extracts were prepared and antiproliferative activity was assayed using sulphorhodamine B assay against breast cancer cell models (MCF7 and T47D). Periodontal fibroblasts were used as a model for healthy cells. GC-MS analysis of the essential oil of the fruits resulted in the identification of forty five components representing 99.17 % of the total oil content while the leaf essential oil yielded 37 compounds representing 93.1% of the total oil content. Oxygenated monoterpen 1,8 cineol was the main component in the fruit (29.82%) and leaf (36.83%) oils. The ethanol extract of the fruits exhibited prominent antiproliferative activity with an IC$_{50}$ of 12.32 µg/ml for T47D cell line and 27.96 µg/ml for MCF7 cells, while the IC$_{50}$ values of the leaves were higher (48.20 µg/ml for MCF7 and 19.77 µg/ml for T47D cells). Least activity was observed with the oils. In an attempt to study the safety of these extracts, the antiproliferative activity of the crude ethanol extract was tested against normal freshly excised human periodontal cells. In those, and after 72 hours incubation, the IC$_{50}$ values for both parts were higher than that determined against the cancer cell lines; (81.34 µg/ml for the fruits and 41.79 µg/ml for the leaves). Ethanol extracts of *Laurus nobilis* have been proven to have antiproliferative activity specifically against breast cancer cell lines, further investigations are run to better understand the mechanism of this activity and to identify the molecule/s responsible for this action.

**Key words:** Hydro-distillation, leaf essential oil, volatile oil, *Laurus nobilis*.

1.2 Real-Time Xcelligence Impedance Analysis of the Cytotoxicity of Plant Extracts on Human Cell Line

**Adamska A., Hering A., Stefanowicz – Hajduk J., Bartoszewski R., and Ochocka J. Renata**
Depart. of Biology and Pharmaceutical Botany, Medical University of Gdansk, Gdansk, Poland.

**Abstract:** Although progress had been made in anticancer drugs development, cancer is still one of main causes of death worldwide. Thus, the search for novel cytotoxic agents continues to be important in the advancement of modern anticancer drugs. The use of plant-derived compounds as anticancer agents contributed to establishing of several important drugs currently used in chemotherapy. The structural diversity of plant compounds and their bioactivity potential, makes them very promising source of novel anticancer agents. Therefore, it is necessary to develop reliable and fast methods to analyze the cytotoxicity of plant extracts in *in vitro* human cell cultures. This study objective was to investigate cytotoxicity of extracts from: *Paris quadrifolia*, *Cyclopia sp.* and *Nigella sativa* in HeLa and HaCaT cell lines, using the real time and label free Roche xCELLigence system. The system consist of the electrical impedance cell sensor array integrated into the bottom of cell culture microtiter plates (E-plates) which provides continuous, quantitative information about the biological status of attached cells. Impedance measurements are displayed as Cell Index (CI) values that correspond to cell number and cell viability. Briefly, xCELLigence cell index impedance measurements were performed according to the instructions of the supplier. After seeding 20 000 cells per well of the E-plate, cell proliferation was monitored every 15 min for a period of up to 48 h by the xCELLigence system. For each extract, following proliferation real time analysis, we determined, base on dose response curves, the half maximal inhibitory concentration (IC50) as well as the time range of the cytotoxic activity. Vinblastine was used as a positive control. Our data showed that the xCELLigence system can be successfully used for dynamic and rapid monitoring of cellular viability and therefore is a suitable tool for testing toxicity of plant extracts against human cell lines.

**Key words:** Analysis, cytotoxicity, human cell, plant extract, xcelligence impedance.
1.3 Antioxidant Activity of *Thapsia garganica* Leaves and Roots Extracts

**Adrar Sabah** and **Bedjou Fatiha**  
Laboratory of Plant Biotechnology Faculty of science, University Bejaia – Algeria.

**Abstract:** The antioxidants play a basic role in the elimination of the toxic reactive oxygen species excess at the origin of various degenerative diseases. Thus, the exploitation of natural plant molecules will be very beneficial for the human health. Therefore, we were interested by the evaluation of the anti-radical activity of the phenolic compounds extracted from our local medicinal plant, *Thapsia garganica*, and that by doing two types of manipulations, of course, after getting the different plant leaves and roots extracts. First, we quantified the phenolic compounds amounts (total phenolics and flavonoids), in order to make a qualitative and a quantitative assessment. Then, we realized the DPPH scavenging activity assay. The experimental results showed that plant extracts were low in phenolic compounds. However, methanolic and ethanolic leaves extracts exhibited a high DPPH scavenging activity, 91.92% and 79.60% respectively, unlike the roots extracts. These observations lead us toward more studies in this field, so that we get more benefits from our local medicinal plants.

**Key words:** Antioxidants, roots extracts, phenolic, *Thapsia garganica*.

1.4 *In Vitro* Antibacterial Properties of Some Plant Extracts Against *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *E. coli*

**Agbaria Sahar**, **Mahajna Shahinaz**, **Basheer A.** and **Masalha Mahmud**  
Al-Qasemi Research Center, Al-Qasemi Academic Collage, Baga Algharbiya 30100, Israle.

**Abstract:** Today we are witnessing a significant increase of bacterial resistance to a wide range of antibiotics reported worldwide. This has prompted intensive efforts to search for new antibiotics as well as for valuable antibacterial plants agents to be used for the treatment of infection diseases. Medicinal plants have been used in traditional medicine as remedies for all kinds of human diseases. The aim of this study was to verify the effect of selected medical plant extracts – *Eucalyptus*, *Rosmarinus officinalis*, *Salvia dominica*, *Salvia fruticosa triloba*, *Saponaria*, *Melissa officinalis*, *Platanus orientalis*, *Melilotus sulcatus*, *Chrysanthemum coronarium*, *Centaura cyanoides* and *Asphodelus ramosus* - against strains of *Staphylococcus aureus* SH1000, *Pseudomonas aeruginosa* ATTC 9027 and *E. coli* ATTC 8739. Twelve dried plants where extracted with 50% ethanol in water. Extracts were investigated for their antibacterial activity against *Staphylococcus aureus* SH1000, *Pseudomonas aeruginosa* ATTC 9027 and *E. coli* ATTC 8739. The MICs and MBC of the different plants extract were obtained using broth microdilution assay. Our ongoing study shows remarkable efficacy of some of the selected plants against *S. aureus*, *E. coli* and *Pseudomonas aeruginosa*. The MIC value for all tested plant extracts ranged from 0.006 to 1.37 mg/ml for *S. aureus*, 0.13 to 3.09 mg/ml for *Pseudomonas aeruginosa* and 0.06 to 5.05 mg/ml for *E. coli*. The MBC value for all tested plant extracts ranged from 0.05 mg/ml to 3.3 mg/ml for *S. aureus* and 0.825 mg/ml to 5.4 mg/ml for *Pseudomonas aeruginosa*. In addition results show that Gram-positive *S. aureus* was more susceptible to all extract tested compared with other bacteria strains. Our results show that several medicinal plants used in our study provide promising sources of potential antibacterial activity. These extracts will now be used for further study to verify synergism with various antibiotics.

**Key words:** *E. coli*, medicinal plants, extracts, *Pseudomonas aeruginosa*, *Staphylococcus aureus*. 
1.5 The Effect of *Nigella sativa* Aqueous Extract on Blood Urea Concentration in Induced Uremic Rats

**Ali Soub Razan**
Faculty of Science, Biology Department, Mu'tah University, Karak, Jordan.

**Abstract:** *Nigella sativa* is an annual flowering plant, native to south and southwest Asia. The seed of *N.Sativa* is used as a spice and in traditional medicine. *N. sativa* aqueous extract was studied on rats with induced renal failure. Our results showed that *N. sativa* aqueous extract decreased the plasma urea concentration to 60% with a standard deviation below uremic control. This study indicates that *Nigella sativa* aqueous extract has an antiuremic effect during in vivo study.

**Key words:** Aqueous extract, blood urea, concentration, *Nigella sativa*, uremic rats.

1.6 Antioxidant Activity of Eight Libyan Medicinal Plants Extracted Using the Microwave Technique

**Alsabri Sami**¹, Zetrini Abdulmottaleb¹, Mohamed S¹, Rmeli N.² and Gbaj Abdul Fatah¹,²
¹National Medical Research Center, Zawia, Libya. ²Tripoli University, Faculty of pharmacy, Department of Natural Products, Tripoli, Libya.

**Abstract:** Natural products perform various functions, and many of them exhibited interesting and useful biological activities. There are more than hundred species that are used by local people in folk medicine for medicinal purposes in Libya. The antioxidants are playing an important role against diseases caused by oxidant damage. The term “antioxidants” refers to compounds that can inhibit the oxidation of lipids or other molecules by inhibiting the initiation of oxidative chain reaction. Researchers are increasingly paying their attention to natural products looking for new leads to develop better drugs against cancer. In this study, eight Libyan medicinal plants belonging to different families were studied for their antioxidant activities. The plants were collected from El-gabel Elakdar (Elbayda) and El-gabel El-gharbi (Gharian), Libya during Spring season (2010), and sent to herbarium of Botany department Faculty of Sciences, Tripoli University, Tripoli-Libya for plant identification. The plants were extracted successively by using microwave method with three different solvents (*n*-hexane, ethyl acetate and methanol). The three extracts of each plant were *in vitro* evaluated for their antioxidant. 2,2-Diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method was adopted for the test using quercetin and ascorbic acid as positive controls. Among twenty four crude extracts, the methanolic extract of *Arbutus Pavarii* was the most active with an IC₅₀ value of 4.55±1.90 μg/ml followed by *Cistus Parviflorus*, *Globularia Arabica*, *Cistus Incanus*, *Quercus Coccifera* and ethyl acetate extract of *Arbutus Pavarii* with IC₅₀ values of 4.75±3.25, 7.65±1.40, 17.75±6.55, 18.65±3.80 and 21.55±9.05 μg/ml, respectively, showed a very strong antioxidant activity. While the methanolic extracts of *Rhamnus Alaternus*, *Helianthemum Lippii* and *Capparis Spinosa*, and the ethyl acetate extracts of *Quercus Coccifera*, *Globularia Arabica* and *Capparis Spinosa* with an IC₅₀ values of 40.7±3.80, 45.2±10.40, 57.75±12.15, 63.75±26.65, 74.75±55.25 and 94.4±8.20 μg/ml, respectively, exhibited a moderate antioxidant activity. The *n*-hexane extracts of *Rhamnus Alaternus*, *Cistus Incanus*, *Cistus Parviflorus* and *Helianthemum Lippii* showed a poor antioxidants activities with IC₅₀ more than 200 μg/ml when compared with quercetin and ascorbic acid (IC₅₀ 3.35±2.3 μg/ml and 15.35±3.2 μg/ml, respectively). Some Libyan medicinal plants can be considered as good sources of natural antioxidants since their extracts were found to possess high antioxidant activity, which can be used against different types of tumours caused by oxidant damage. Most of the extracts that exhibited the strong activities were methanolic extracts (relatively polar), while those that showed moderate activities were ethyl acetate extracts (semi polar). All of the non-polar extracts (*n*-hexane) did not show any antioxidant activity. In fact this reveals that most antioxidant compounds from plants are polyphenolic compounds, where can be extracted with polar and semi polar solvents.

**Key words:** Antioxidant, extract, medicinal Plants, microwave technique.
1.7 High Inhibition Effect on Lipid Peroxydation by Phenolic Extracts from Some Local Medicinal Plants

Amar DJERIDANE, Nourelhouda RENANE and Mohamed YOUSFI

Abstract: Antioxidant activities and phenolic content of extract and solvent-solvent partition fractions from the aerial parts of four medicinal plants were evaluated. Arial parts of Asteriscus pygmaeus, Hammada elegans, Plantago ciliate and Thymelia microphylla were extracted with gradient polarity of different solvents. The extracts were then extracted by liquid-liquid partition with different organic solvents to obtain sixteen fractions. Next, the phenolic content of all these fractions were analysed by Folin-Ciocalteu method and their inhibition of peroxidation of linoleic acid and sunflower oil were evaluated by lipid peroxide ammonium thiocyanate method. The total phenolic content of the different Hammada elegans fraction varied from 0.045 to 0.0714 mg/g dry weight, expressed as gallic acid equivalents (GAE). Whereas, the percentage inhibition of peroxidation of linoleic acid and sunflower oil was found to be higher in methanolic fraction, it was comparable to α-tocopherol, trolox, BHT and BHA. In this study, a direct relationship between the total phenolic content with inhibitory activity towards lipid peroxidation was observed. This indicates that phenolics are the main contributors for the observed antioxidant activities for different plants extracts. These results, suggest that the level of antioxidant activity in these plants varies to a great extent. They also suggest that phenolics in these plants provide substantial antioxidants. Upon achievement of this survey, and using more samples, extra benefits of these medicinal plants may be completed. Flora of Algeria appears to be a rich and interesting source for supplementary ethnomedicinal and phytochemical studies.

Key words: Hammada elegans, lipid peroxidation, phenolics, medidinal plants.

1.8 Antimicrobial and Antioxidant Activity of Fraxinus excelsior Extract

ARRAR Lekhmici¹, AMAMRA Samra¹, ZERROUG Mohammed Mihoub², BELHADDAD Oum Elkheir¹, CHAREF Noureddine¹, KHENNOUF Seddik³, NICKLIN Jane⁴ and BAGHIANI Abderrahmane¹
¹Laboratory of Applied Biochemistry, Faculty of Nature and Life Science, University Ferhat Abbas, Setif. ²Laboratory of Applied Microbiology, Faculty of Nature and Life Science, University Ferhat Abbas, Setif. ³Laboratory of Phytotherapy applied to Chronic diseases, Faculty of Nature and Life Science, University Ferhat Abbas, Setif, Algeria. ⁴School of Biological and Chemical Sciences, Birkbeck College, University of London, UK.

Abstract: Medicinal preparations derived from natural sources, especially from plants, have been in widespread use since time immemorial. In this study, oil extract of Fraxinus excelsior was tested to evaluate its antioxidant effects and antimicrobial activity against twelve bacteria and three phytopathogenic fungi. The results showed that the oil (petroleum ether) extract contained moderate amount of polyphenols and flavonoids. DPPH test showed an EC₅₀ of 3722.5 ± 72.84 μg/ml. Using beta carotene/linoleic acid method, the oil extract of F. excelsior inhibits the lipid peroxidation with an IC₅₀ of 70 % after 24 h which is a good effect. On the other hand petroleum ether extract inhibited the growth of the tested microorganisms with different zones of inhibition from 8 mm to 15 mm except for Lysteria monocytogenes, Salmonella typhimurium and the bacteria isolated form human samples. The antimicrobial effect of this extract varied with microorganism’s species and its own concentration. Thus at the 12.5 mg/ml, an inhibition diameter of 14 mm was recorded with Ascochyta rabiei and Fusarium solani f. sp. coeruleum and Fusarium oxysporum f. sp. albedinis but only 8.7 mm for Candida albicans even at extract concentration of 25 mg/ml. The same phenomenon was observed with the antibacterial activity. A zone of inhibition of 8 mm was observed with Staphylococcus aureus using the extract at 50 mg/ml. The concentration of 25 mg/ml gave inhibition zones of of 10 mm, 9.3 mm and 8.5 for Enterococcus faecalis, Acinetobacter baumannii and Salmonella typhimurium respectively. The 12.5 mg/ml inhibited the growth of E. coli with 9.3 mm. At the 6.25 mg/ml, inhibition zones of 15 mm and 8 mm was obtained for Bacillus cereus and Pseudomonas aeruginosa respectively.

Key words: Antibacterial, anti-fungal effects, antioxidant, Fraxinus, petroleum ether extract.
1.9 Preventive and Curative Effect of the Methanolic Extract of *Ajuga iva* on Collagen Induced Arthritis in Rats

ARRAR Lekhmici\(^1\), DIAFET Abdelwahab\(^2\), CHARIF Noureddine\(^1\), KHENNOUF Seddik\(^3\) and BAGHIANI Abderrahmane\(^1\)

\(^1\)Laboratory of Applied Biochemistry, Faculty of Nature and Life Science, University Ferhat Abbas, Setif. \(^2\)Department of Biology, University Bachir El Ibrahimi, Bordj Bou Arreridj. \(^3\)Laboratory of Phytotherapy applied to Chronic diseases, Faculty of Nature and Life Science, University Ferhat Abbas, Setif, Algeria.

**Abstract:** The use of medicinal plants is now the form of medicine most widely around the world. Rheumatoid arthritis affects 1% of the adult population, and has a significant impact on physical functioning and social life of patients. In rats, induction of arthritis by collagen II causes alterations of synovial joints similar to patients with rheumatoid arthritis. In this work the collagen induced arthritis model is used to evaluate the anti-arthritic effect of *Ajuga iva* methanolic extract. Arthritis was induced by collagen emulsified with complete Freund's adjuvant. Arthritic rats were treated orally with the methanolic extract of *Ajuga iva*. For preventive effect 30 and 60 mg / kg of body weight, were given daily from the first day of immunization for 21 days. For the cure, 100 and 150mg/kg of body weight were daily administrated for a period of 21 days after onset of signs of arthritis. Changes in body weight, swelling of the legs, level of protein C, sedimentation rate, and the histopathological status of articulation were evaluated as markers of inflammation associated with arthritis. In preventive treatment of rats, methanolic extract of *A. iva* inhibited significantly the markers of inflammation and arthritis in comparison with the positive control rats (arthritic rats). *Ajuga iva* methanolic extract, in the curative treatment, reduced significantly the swelling of legs and other parameters of inflammation such as CRP, ESR and leukocytes. Histopathological examination showed reduced erosion and destruction of bone. The results of our study show that the methanolic extract of *A. iva* plays an effective role in the prevention and treatment against collagen induced arthritis. The way by which the components contained in this extract act to prevent or to reduce the inflammation is not clear but it may be due to their inhibition of the pro-inflammatory cytokines.

**Key words:** *Ajuga iva*, anti-arthritic effects, collagen induced arthritis, methanolic extracts.

1.10 Antioxidants as Therapeutic Targets for Cardiovascular Health

**Badiaa Lyoussi**

*Laboratory physiology-Pharmacology & Environmental Health University Sidi Mohamed Ben Abdallah, Fez, Morocco*

**Abstract:** It is generally believed that diseases caused by oxidative stress should be treated with antioxidants. Numerous natural products containing iron binding agents can be essential in the maintenance of human health. Treatment with antioxidants has been suggested to lower oxidative stress and therefore blood pressure. So many therapeutical strategies have been tested in animal and human to prevent the occurrence of these oxidative diseases. They use nutritional improvement of antioxidant capacities, plant or chemical antioxidants. Chemists designed various new molecules chelating iron, scavenging free radicals or catalysing destruction by miming the activity of antioxidant enzymes. But new ways of research have to be now explored to create more specific and tissue targeted molecules able to regulate the intracellular level and not only to destroy oxygen radicals. Polyphenolic compounds in plants exert cardioprotective effects linked to their free radical scavenging. Therefore the importance of searching for and exploiting natural antioxidants, especially of plant origin, has increased greatly in recent years. Plant and plant
products are being used as a source of medicine since long. The medicinal properties of plants have been investigated in the recent scientific developments throughout the world, due to their potent antioxidant activities, no side effects and economic viability. Flavonoids and phenolic compounds which are widely distributed in plants have been reported to exert multiple biological effect, including antioxidant, free radical scavenging abilities, anti-inflammatory, etc. Numerous studies indicate that regular intake of polyphenol-rich beverages (Tea) and foods (Chocolate, Fruit, and Vegetables) is associated with a protective effect on the cardiovascular system. Experimental and clinical studies have also indicated that chronic intake of several polyphenol-rich natural products is able to improve endothelial dysfunction and to decrease vascular oxidative stress associated with major cardiovascular diseases such as hypertension. Experiments from our laboratory with isolated arteries have shown that polyphenols cause nitric oxide (NO)-mediated endothelium-dependent relaxations and increase the endothelial formation of NO. Thus, these experimental and clinical studies highlight the potential of polyphenol-rich sources to provide vascular protection in health and disease. There is a growing interest in the food industry and in preventive health care in the development and evaluation of natural antioxidants from plant materials. Some plants contain considerable amount of polyphenolic substances, which have been reported to have antioxidant activity. These polyphenolic substances are also known as proanthocyanidins (also referred to as procyanidins) are one of the most beneficial groups of plant flavonoids.

Key words: Antioxidant, free radicals, hypertension, Natural products, stress.

1.11 Evaluation of Combination Effect of Stilbenoid from *Shorea gibbosa* with Vancomycin Against Methicillin-Resistant *Staphylococcus aureus* (MRSA)

**Basri Dayang Fredalina¹, Azmi Abdul Muin¹, Chan Kin Luo¹ and Latip Jalifah²**

¹School of Diagnostic & Applied Health Sciences, Faculty of Health Sciences, Universiti Kebangsaan Malaysia. ²Centre Of Chemical Science & Food Technology, Faculty of Science & Technology, Universiti Kebangsaan, Malaysia.

**Abstract:** Stilbenoids have high potential in natural product research and pharmaceutical industry. The aim of this study was to determine the effects of various stilbenoids from *Shorea gibbosa* combined with vancomycin against methicillin-resistant *Staphylococcus aureus* (MRSA). A total of nine stilbenoid compounds, 5 stilbenoid dimers; ε-viniferin, amelpolpin A, balanocarpol, laefifonol and diptoindonesin G and 4 stilbenoid trimers; α-viniferin, johoreinol A, amelpolpin E and vaticanol G were evaluated for their antibacterial activities against two strains of MRSA; ATCC 33591 and Hospital Universiti Kebangsaan Malaysia (HUKM) clinical isolate. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) for each active compounds were determined using serial broth microdilution and plate streaking technique. Combination effect of stilbenoids with vancomycin against MRSA was evaluated using checkerboard assay to determine their fractional inhibitory concentration (FIC) index values. The MIC value of α-viniferin on both MRSA strains was 0.1 mg/ml whereas the MIC value of johoreinol A on ATCC 33591 and HUKM strain was 0.1 mg/ml and 0.2 mg/ml, respectively. On the other hand, the MIC values of amelpolpin E and vaticanol G were higher than 0.4 mg/ml. Out of five stilbenoid dimers tested, only ε-viniferin was capable of inhibiting the growth of both MRSA strains at MIC value 0.4 mg/ml. The MBC value of ε-viniferin showed bacteriostatic action against MRSA. The result of MBC determination also showed that α-viniferin and johoreinol A were bacteriostatic. Using checkerboard assay, the FIC index value of ε-viniferin in combination with vancomycin showed the additive effect which was 0.5625. The combination effect of α-viniferin and vancomycin on both MRSA strains and johoreinol A-vancomycin combination against HUKM strain were also additive (0.5< FIV ≤2.0). Only the combination effect of johoreinol A and vancomycin against ATCC 33591 was synergistic (FIC<0.5). In conclusion, stilbenoid compounds from *Shorea gibbosa* has anti-MRSA activity and high potential of becoming an alternative phytotherapy in combating MRSA infection in future.
Key words: Antibacteria, growth, Shorea gibbosa, Stilbenoids.

1.12 Anti-Inflammatory Effect of Essential Oils of Mentha pulegium and Rosmarinus officinalis

Bedjou fatiha, Tamendjari lynda, and Touati naima
Laboratoire de biotechnologie végétale et d'ethnobotanique, faculté des sciences de la nature, université de Béjaia, Algérie.

Abstract: Mentha pulegium and Rosmarinus officinalis belong to Lamiaceae family. Their multiple pharmacological properties have been known since the antiquity. These aromatic plants are commonly used by Algerian population for treating several diseases. In our study we have extracted essential oils of these two plants by the method of hydrodistillation and have tested them in vivo on mouse (Mus musculus) to evaluate their anti-inflammatory effect. The results showed that the yield of extraction is higher in the case of Mentha pulegium, compared to Rosmarinus officinalis and the essential oil of Mentha pulegium is more efficient than that of Rosmarinus officinalis. The disappearance of oedema provoked by carrageenan was obtained at 90 min for Mentha pulegium used at 4%, and at 120 min for the same oil used at 2%. Rosmarinus officinalis essential oil was less efficient. The disappearance of oedema was obtained at 120 min for the concentration of 4% , and at 150 min for the concentration of 2%. For the control disappearance of oedema was obtained at 240 min. CPG analysis of the two essential oils showed that the major components are: the pulegone and the alpha pinene for Mentha pulegium and the linalol and the p-cymene for Rosmarinus officinalis. The presence of terpenes in these oils explain their anti-inflammatory effect.

Key words: Inflammatory, Mentha pulegium, Rosmarinus officinalis, terpenes.

1.13 Evaluation of the Antimicrobial Activity of Polyphenols Extracted from the Leaves of Citrus limon Harvested Near Algiers

Belguendouz, R1, Asfour F1, Meddaхи, H1, Biche, M2, and Houmani, Z3
1,3Laboratory for Research on Medicinal and Aromatic Plants, University Sâad Dahlab, Blida.
2Laboratory of Zoology, National College of Agricultural Sciences in Algiers.

Abstract: The use of medicinal plants and their products is gaining more interest worldwide, especially by companies fundamentally oriented research of healthy living and a return to nature. The plant is the best source of biologically active molecules with therapeutic properties. These molecules serve as sources for the formulation of new drugs with negligible side effects. Polyphenols are molecules with antioxidant and stimulant of microorganisms; they participate in the fight against microbial diseases and free radicals which are responsible for many cardiovascular diseases especially in the elderly, athletes and smokers. In this study, we looked at Citrus limon. It is extracted by solvents and assayed by the method of Folin-Ciocalteu total polyphenols from the leaves, to assess their performance relative to the harvest period, to analyze the extracts obtained by HPLC. The results show that the yields of these compounds vary with the harvest period. The best yield of total polyphenols was obtained in the month of July (10.50%). Chromatographic analyzes (HPLC) showed that the Gallic acid concentration is 8.49 mg / l in October (autumn), 5.18 mg / l in July (summer) and 4.31 mg / l in the month of April (spring). Sensitivity tests of the extracts obtained during the three harvest periods (April, August) were realized on 09 species: of Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pneumonia, Escherichia coli, Pseudomonas aeruginosa, Klebsilla pneumoniae, Proteus mirabilis, Penicelium digitatum and Condida albicans. These tests revealed that only the bacterium Staphylococcus aureus showed high sensitivity of the concentrations of 12.5%, 25%, 50% and 100% of the extracts obtained from leaves harvested in the month of August and with zones of inhibition ranging from 16.33 ± 0.58mm to 9.67 ± 1.58 mm in diameter. These results highlight the interest to continue this research to define a model of inhibition of certain microorganisms that cause diseases, from extracts of plant origin, particularly the phenolic extracts.
Key words: Anti-microbia, antioxidant, *Citrus limon*, gallic acid, micro-organisms, polyphenols.

1.14 Antioxidant Activities in *Calycotome villosa* L. (*Fabacées*) from National Park of Bou Kornine, Tunisia

Ben Jemia Mariem¹, Hamdaoui Ghaith¹, Bruno Maurizio², Kchouk Mohamed Elyes.¹

¹Laboratoire des Plantes Extrêmes - Biotechnologic Center Borj-Cedria Technopark, B.P. 901, 2050 Hammam-Lil, Tunisia. ²Department STEMBIO, Sect. of Organic Chemistry, University of Palermo, Viale delle Scienze, Parco d’Orléans II - 90128 Palermo, Italy.

Abstract: The present study was conducted to evaluate the antioxidant activities of the methanolic extracts of *Calycotome villosa* leaves. Plant material was collected from the National Park of Bou Kornine (Tunisia) and fresh plant samples were dried and ground into a fine powder and extracted with methanol at room temperature for 30 min. Extracts were kept for 24 h at +4°C, then filtered, evaporated under vacuum and stored in sealed vials under N₂ at +4°C. Antioxidant activity was determined by four different methods namely DPPH, β-carotene/linoleic acid, reducing power and metal chelating activity assay. Additionally total phenolic, flavonoid and tannins contents of the methanolic extracts have been quantified. Results showed that, *Calycotome villosa* leaves exhibited high phenolic contents, especially total phenols (34, 9 ± 0,01 mg GAE g−1 DW) and flavonoids (18.99 ±0, 14 mgEC g−1 DW). Extracts exhibit a higher antioxidant activity with β-carotene/linoleic acid bleaching test (IC₅₀ = 29.8±0, 13µg /ml). EC₅₀ values of reducing power activity were 20±1, 13µg/ml. *Calycotome villosa* may be considered as an interesting source of antioxidants.

Key words: Antioxidant activities, *Calycotome villosa* L., leaves, polyphenols.

1.15 Antimicrobial Effect of Essential Oil of Artemisia herba alba Asso.

BENREBIHA F.*, IFTENE, N., EZZIAT, H., CHAOUIA, C., and BOUCHENAK F.

Université SAAD DAHLEB, BLIDA, Algérie.

Abstract: The white wormwood recognized as forage for Excellence for protein intake and it's medicinal whether for animal or human capital is a significant. Used for its traditional medicinal use and studied in recent years in several countries to determine its chemical compounds in its essential oil of interest to the pharmaceutical, cosmetic and food. In our work we started by extracting the essential oil by steam distillation of water. The compounds of the essential oil were identified by CG/MS. Microbial activity is tested on three bacterial strains (E. coli, K. pneumonia and S. aureus). The results of the analysis CG/MS showed that the major compound is camphor. Tests of antimicrobial activity revealed that the essential oil of Artemisia white has an inhibitory effect on the strains tested.

Key words: Antimicrobial activity, camphor, E. coli, essential oil, K. pneumonia, S. aureus.

1.16 Study of the Antioxidant, Inflammatory, Analgesic Activities, Acute and Subacute Toxicity of the Extracts of *Thapsia garganica*

BERRI Yasmine, BEDJOU Fatiha and Bougoffa Khalida

Faculté des sciences de la nature et de la vie,Département de physico-chimique biologie, Université A. Mira Bejaia-Algerie.

Abstract: *Thapsia garganica* belongs to the family Apiaceae, widespread in the Mediterranean. They have several various biological properties which are due to their richness in bioactive substances. In this study, our interest has been, the one hand, to the phenolic composition,
reducing power and DPPH radical scavenging of methanolic extracts of the three plant parts (roots, leaves and flowers). It shows that the roots are richer than the other two parts with total phenolic 214.91 mg/100g DW, tracking flowers and leaves. Flavonoids and anthocyanins in flowers are dominant, while condensed tannins are a majority in the roots. The test of reducing power indicates greater activity of the extracts of leaves, knowing that they are quantitatively less rich in phenolic compounds. Similarly to the scavenger effect against DPPH radical with IC50 of 9.98, 10.08 and 19.32 mg/100 ml for the leaves, flowers and roots, respectively. On the other hand, acute toxicity tests classify infusions of the three parts of the plant substances in the categories of “practically nontoxic” or “relatively safe” with LD 50> 10 g / Kg. The results of subacute toxicity at 1 g / Kg showed elevated levels of transaminase “AST” in the three groups that received infusions of Thapsia garganica and elevated blood urea in the lots receiving preparations from roots and leaves. It also follows that these infusions exert a pro-inflammatory and analgesic effect.

Key words: Thapsia garganica methanolic extract, phenolic.

1.17 Evaluation of Antioxidant Activity and Stability of Morinda citrifolia Fruit Extract

Borisut P1,., Tansiriatkongkol A1,., Sucontphunt A2,., Chansriniyom C2, and Nimmannit Ubonthip2

1Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, Chulalongkorn University. 2National Nanotechnology Center (NANOTEC), National Science and Technology Development Agency (NSTDA), Klongluang, Pathumthani 12120, Thailand.

Abstract: The present investigation focused on the method of extraction to get the highest antioxidant activity of Morinda citrifolia (noni) fruit extract. The chemical stability and safety of noni fruit extract were also studied. The noni fruit is a multiple fruit with pungent odor when ripening. Noni fruit has been used as medicinal plant from ancient time. Researches on the phytochemical constituents and biological activity revealed that compounds in noni are beneficial for skin health. The fruit juice was freeze-dried. The residue was further extracted by ethanol, acetone and ethyl acetate. All of the extracts were determined their activities against 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging. The extract which showed highest activity was further partition by hexane and ethyl acetate. The IC50 was determined using DPPH assay. The safety evaluation was determined by MTT assay using keratinocyte (HaCaT). The chemical stability was determined by HPLC. Extracts were incubated at ambient, 4°C and 40°C for 2, 4 and 6 months and protected from light. The active constituents in noni fruit extract which used as a marker was scopoletin. The ethanol extraction showed the highest antioxidant activity of 0.24 mg/ml at the first step of extraction then it was chosen for further partition by hexane and ethyl acetate. The IC50 value for DPPH assay of ethyl acetate extraction was 0.014 mg/ml. The extract concentration of 1.2 mg/ml was reported as same as 100% control cell viability value. For chemical stability determination, the scopoletin was detected at 12.9 min using HPLC. The concentration of scopoletin in the ethyl acetate extraction showed no significant reduction after incubation at ambient, 4°C and 40°C for 2, 4 and 6 months. Ethanol was used for extraction of the residue from noni fruit, then hexane and ethyl acetate was used for further extraction. The antioxidant activity of the ethyl acetate extract was 0.014 mg/ml. The safety concentration of extract was 1.2 mg/ml. It was stable at ambient temperature, 4°C and 40°C protected from light for 6 months.

Key words: Antioxidant activity, fruit extract, Morinda citrifolia, stability.
1.18 Preparation and Characterization of Some Chlorinated 3, 5-Diaryl-2-Pyrazolines Analogue of Natural Product as Antimicrobial Agents

Boufas Sihem¹ and Benmekhbi Lotfi²
¹Université 20 Août 1955, Skikda. ²Université de Msila. Algeria.

Abstract: Variously substituted pyrazolines and their derivatives analogue of natural product isolated from various medicinal plants are important biological agents and a significant amount of research activity has been directed towards this class; their prominent effects are antimicrobial¹ antifungical, antiviral, antiparasitic, anti-tubercular² and insecticidal agents. A series of chlorinated 3, 5-diaryl-2-pyrazolines has been synthesized by the reaction of appropriately substituted chlorochalcones (analogue of flavonoids) and phenyl hydrazine in hot acetic acid solution. The structures of all compounds have been elucidated by microanalysis and H- and C- NMR spectroscopic measurements. The antibacterial activities of the synthesized compounds against staphylococcus aures ATCC 6538, Escherichia coli ATCC 8739, klebsiella pneumoniae ATCC 4352, pseudomonas aeruginosa ATCC 1539, proteus mirabilis, were tested using disk diffusion method and the minimum inhibitory concentration (MIC) Method. All the determinations tests were performed in triplicate and the results were taken as a mean of at least three determinations. The tested compounds exhibited different degrees of antibacterial activities or inhibition actions.

Key words: Antimicrobial agents, characterization, chlorinated 3,5-diaryl-2-pyrazolines analogue, natural Product

1.19 Total Polyphenolic Contents and Antioxidant Activity of Santolina chamaecyparissus

Bouriche Hamama, Benbrinis Soumia and Senator Abderrahmane
Department of biochemistry, Faculty of Natural Sciences and Life, University Ferhat Abbas, Setif.

Abstract: Currently, efforts have been put to identify natural compounds that can act as suitable antioxidants to replace synthetic ones. These naturally occurring antioxidants can be formulated as functional foods and nutraceuticals that can help to prevent oxidative damage occurring in the body. Herbal products in experimental screening methods are important to establish the active component and appropriate plant extracts. In this study, the total polyphenolic and flavonoid compounds were determined in the aqueous and methanolic extracts of Santolina chamaecyparissus by using the Folin-Ciocalteau and colorimetric aluminum chloride methods, respectively. Moreover, the antioxidant potential of these extracts was evaluated. The total polyphenolic compounds in the aqueous and methanolic extracts were 73.84 µg gallic acid equivalents/mg and 105.88 µg gallic acid equivalents/mg, respectively. While, the total flavonoids were 12.81 µg quercetin equivalent/mg and 20.99 µg quercetin equivalent/mg, respectively. At 50 µg/ml aqueous and methanolic extracts inhibited linoleic acid peroxidation by 64% and 61%, respectively. These values are very close to that obtained with the standard antioxidant, BHT. On the other hand, the two extracts exhibited good but lower reducing power. Based on the results obtained, the extracts from Santolina chamaecyparissus may be valuable natural antioxidant sources and are potentially applicable in both medicine and healthy food industry.

Key words: Antioxidant, extract, flavonoids, nutraceuticals.
1.20 Human Xanthine Oxidase Inhibition, Antioxidant, Antihemolytic and Antibacterial Activity of Globularia Alypum L. Extracts

BOUSSQUALIM Naouel¹, TRABSSA Hayat, AOUACHRIA Sana, BOUMERFEG Sabeh, ARRAR Lekhmici, BAGHIANI Abderrahmane.
¹Laboratory of applied Biochemistry, Department of biochemistry, Faculty of nature and life science, University Ferhat Abbas, Setif. Algeria.

Abstract: The aim of this study was to evaluate the Xanthine Oxidase (XO) inhibit ory effect, antioxidant ex-vivo properties, anti-hemolytic and antibacterial activity of Globularia Alypum (GA) extracts. GA were submitted to extraction and fractionation to give methanolic extract (CrE), chloroformic extract (ChE), ethyle acetate extract (EAE) and aqueous extract (AqE). Total polyphenols contents of GA extracts were determined, EAE is the most rich in polyphenols (157,74± 5,27 mg gallic acid equivalent/g dry extracts). GA extracts inhibited XO in a concentration-dependent manner. The EAE showed the highest inhibitory effect on the XO activity with IC₅₀ = 0.083 ± 0.001 mg/ml, followed by CrE and ChE. The serum ability to inhibit DPPH radical was measured, The CrE was found to exhibit the greatest scavenger activity with 48.41± 2.763%, followed by AqE and EAE with IC₅₀ of 40.54± 7.51% and 41.79± 1.654%, respectively. Total antioxidant capacity of plasma, and red blood cells were measured, EAE and AqE increase significantly HT₅₀ (the half hemolysis time) with 149.8± 1.887 and 145.9± 2.103 min, respectively. The hemolysis is lagged, indicating that endogenous antioxidants in the erythrocytes can trap radicals to protect them against free-radical-induced hemolysis. The antibacterial activity of the four subfractions was evaluated by disc diffusion assay against 11 ATCC strains. ChE and EAE extracts were the most active against both gram-positive and gram-negative bacteria. Our results showed a great relationship between the polyphenols contents and the activities of different fractions of the plant.

Key words: Antibacterial, Globularia Alypum, hemolysis, polyphenols, Xanthine oxidase.

1.21 Polyphenols Content and In Vitro Antioxidant Activity of Inula viscosa

Boussouf, Lilia¹,², Boutennoue, Hanane¹,², Madani, Khodir² and Kebieche, Mohamed¹
¹Molecular and Cell Biology Department, University of Jijel. ²3BS Laboratory, University of Bejaia-Algeria.

Abstract: There is abundant evidence that a great number of aromatic, spicy, medicinal and other plants contain chemical compounds exhibiting antioxidant properties. With this respect a particular interest has been given to plant polyphenols. The natural polyphenols have an ideal structure for capturing of free radicals and it was found that their antioxidant activity surpasses the effect of known antioxidants, such as the vitamins A and E. In this study, methanol extract from Inula viscosa was evaluated to investigate its phenols content, and in vitro antioxidant activity using three different methods: 1,1- diphenyl 2- picryl-hidrazyl (DPPH) radical scavenging assay, reducing activity of H₂O₂ and ferric reducing power assay. Total phenolic content was determined as gallic acid (GAE) equivalent. Flavonoids and flavonols contents were determined as quercetin (QE) equivalents. The obtained results showed that the total phenolic content was 322.48mg GAE/g crud extract (CE). The amount of total flavonoids and flavonols were 105 mg QE/g CE and 47.5 mg QE/g CE respectively. The results of the antioxidant activity indicated that Inula viscosa recorded a good capacity.

Key words: Antioxidant activity, flavonoids, flavonols, Inula viscosa, phenolic content.
1.22 *Eucalyptus globulus*: Polyphenols Extraction and Antioxidant Effect

Boutennoune Hanane¹, Boussouf Lilia¹, Madani Khodir² and Kebieche Mohamed³

¹Molecular and Cell Biology Department, University of Jijel-Algeria. ²BS Laboratory, University of Bejaia-Algeria. ³Phytopharmacology laboratory, University of Jijel-Algeria.

Abstract: There is abundant evidence that a great number of medicinal plants contain chemical compounds exhibiting antioxidant properties. With this respect a particular interest has been given to plant polyphenols. The natural polyphenols have an ideal structure for capturing of free radicals and it was found that their antioxidant activity surpasses the effect of known antioxidants, such as the vitamins A and E. In this study, methanol extract from *Eucalyptus globulus* was evaluated for its phenols content using Folin-Ciocalteu reagent, and antioxidant activity using different methods: 1,1- diphenyl 2- picryl-hidrazyl (DPPH) radical scavenging activity, reducing activity of H₂O₂ and ferric reducing power assay. The result for total phenols content shows a high content of these compounds. An important content of flavonoids and flavonols was also detected. The results of the antioxidant activities obtained indicate that, about of measurement method, *Eucalyptus globulus* records a high capacity.

Key words: Antioxidant activity, *Eucalyptus globulus*, methanol extract, polyphenols.

1.23 Chemical Analysis and Antimicrobial Activity of Essential Oils of *Pistacia lentiscus* L. Harvested in Boumerdes

CHEBOUTI-MEZIOU N¹, MERABET A.¹ FARES A¹, GHEZRAOUI D¹BISSAAD F.Z.¹ and DOUMANDJI S.²

¹Department of biology, University of Boumerdes. (U M BB). ²Nationally School superior agronomy (E.N.S.A). Laboratory of Soft Technology Valorization Physical-Chemical Characterization and Biodiversit, Algeria.

Abstract: *Pistacia lentiscus* L.family (Anacardiaceae) is an evergreen shrub native to the Mediterranean region and Middle East. The leaves of *P. lentiscus* (mastic tree) *P. lentiscus* samples were collected in October in a forest ecosystem of northeastern Algiers (Khemis Elkhechna). The leaves were air dried in a shadowy place, then ground into powder. The essential oil from the leaves of *Pistacia lentiscus* grown in Algeria was obtained by the hydrodistillation method, separating the components of the extracts was performed by the method of thin layer chromatography (single and two-dimensional polyamide). We conducted microbiological tests on gram-positive and gram-negative bacteria, on fungi and yeasts. We noted that the mastic tree oils are active against bacteria more than fungi and yeasts.

Key words: *Pistacia lentiscus*, essential oil, forest ecosystem, Algeria, bacteria, fungi chromatography.

1.24 GC-MS Analysis of Bioactive Petalostigma Extracts: Toxicity, Antibacterial and Antiviral Activities

Cock I.E.¹,² and Kalt F. R.¹

¹Environmental Futures Centre &²Biomolecular and Phys. Science, Griffith Univ, Brisbane, QLD.

Abstract: Petalostigma (known locally as quinine tree), an Australian genus of the Euphorbiaceae family, has a long history of ethnopharmacological usage in the treatment of sore eyes and toothaches, as well as usage as a general antiseptic agent. *P. pubescens*, and *P. triloculare* solvent extracts were tested for antimicrobial activity, antiviral activity and toxicity in vitro by disc diffusion assays, MS2 bacteriophage plaque reduction assays and Artemia nauplii
mortality bioassays respectively. The methanol, water and ethyl acetate leaf and fruit extracts of *P. pubescens*, and *P. triloculare* displayed potent antibacterial activity in the disc diffusion assay. The methanol and ethyl acetate extracts proved to have the broadest specificity, inhibiting the growth of 10 of the 14 bacteria tested (71 %) for the leaf extract and 9 of the 14 bacteria tested (64 %) for the fruit extracts. The water extracts of the leaf and fruit also had broad spectrum antibacterial activity, inhibiting the growth of 8 (57 %) and 7 (50 %) of the 14 bacteria tested respectively. All extracts which displayed antibacterial activity were approximately equally effective against Gram-positive and Gram-negative bacteria, each inhibiting the growth of 50-75% of the Gram-positive and Gram-negative bacteria tested. The methanol, water and ethyl acetate extracts also displayed antiviral activity in the MS2 plaque reduction assay. The methanol and water extracts inhibited 26.6 - 49.0 % and 85.4 - 97.2 % of MS2 plaque formation respectively, with the fruit extracts being more potent inhibitors. All ethyl acetate extracts inhibited 100 % of MS2 plaque formation. All *P. pubescens*, and *P. triloculare* extracts were also shown to be non-toxic or of low toxicity in the *Artemia franciscana* bioassay. Analysis of these extracts by RP-HPLC showed that the *P. triloculare* ethyl acetate fruit extract was the least complex of the bioactive extracts. Subsequent analysis of this extract by GC-MS revealed that it contained 9 main compounds: acetic acid; 2,2-dimethoxybutane; 4-methyl-1,3-dioxane; decane; undecane; 2-furanmethanol; 1,2-benzenediol; 1,2,3-benzenetriol; and benzoic acid. The lack of toxicity of the *P. pubescens*, and *P. triloculare* extracts and their inhibitory bioactivity against bacteria and viruses validate Australian Aboriginal usage of *Petalostigma* species and indicates its medicinal potential.

**Key words:** Antibacterial, antiviral extracts, *Petalostigma*, toxicity.

**1.25 Antioxidant, Antibacterial and Hypoglycemic Activity of Extracts from *Thymelaea microphylla* coss. et dur.**

**Dahamna Saliha**, **Dehimi, Khadidja**, **Belguet, Assia**, **Boussahel, Soulef**, **Merghem, Mounira**, **Rezzagui, Abir** and **Harzallah, Daoud**

**Laboratory of Phytotherapy Applied to Chronic Diseases, Department of Animal Biology and Physiology, Faculty of Natural and Life Sciences, University Ferhat Abbas.** **Laboratory of Applied Microbiology, Department of Microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbas, Sétif, 19000, Algeria.**

**Abstract:** *Thymelaea microphylla* is a medicinal plant with a Saharan affinity, belonging to the Mediterranean genus *Thymelaea*. Two different extracts were prepared from leaves and flowers of the plant: aqueous and ethanolic extract. Antioxidant activity was determined using two methods: 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, and the inhibition of lipid peroxidation using the β-carotene / linoleate model system. The antioxidant effects of the extracts were compared with those of commercial antioxidants; In this study butylated hydroxytoluene (BHT) was used as a positive control. Both extracts had a very low scavenging ability against DPPH radical. In the second method, ethanolic extract had a high antioxidant activity (RAA=77.86%), in comparison with aqueous extract (RAA=46.40%). In order to investigate the antimicrobial activity of extracts, four different bacterial strains were used: *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella oxytoca* (Gram-negative) and *Staphylococcus aureus* (Gram-positive). The disc diffusion agar method described by Bauer (1966) was used; the results suggest that both extracts have no inhibitory effect on studied bacterial strains, except an intermediary antimicrobial activity against *Klebsiella oxytoca*. In this work, we tried to study the hypoglycemic activity of the aqueous extract on *Albinos Wistar* rats. Results indicates that a single administration of the aqueous extract from *Thymelaea microphylla* at a dose of 250mg/Kg body weight, caused a very significant decrease in blood glucose level after 120 minutes of administration in comparison with control group.

**Key words:** Antibacterial, antioxidant, extract, Hypoglycemic, *Thymelaea microphylla*.
1.26 Antioxidant and Antiulcerogenic Effects of *Globularia alypum* L. Extracts

**Derrafa I., Benchikh Fatima, Amira S., Khennouf S. and Dahamna S.**
*Department of Animal Biology and Physiology, Faculty of Nature and Life Sciences, University Ferhat Abbas, Setif, Algeria.*

**Abstract:** *Globularia alypum* L. is widely used as a medicinal plant in Algeria. In this context, we estimated the antioxidant and anti ulcerogenic activity of various solvent extracts prepared from the aerial parts of this plant. The quantitative analysis of plant material reveal that these extracts are rich in polyphenolic compounds (41.04 to 136.66 mg EAG/G of extract) for total polyphenols, (10 to 15.52 mg ER/G of extract and 5.04 to 6.68 mg EQ/g of extract) for flavonoids and (52.88 to 164.33 mg ETA / G of extract) for tannins. The evaluation of the scavenging capacity of the extracts with respect to DPPH shows that the crude methanolic (CrME), the aqueous (AqF) and the ethyl acetate (EaF) extracts were the most active, with an IC$_{50}$ of 33.32 , 36.12 and 38.29 µg/ml respectively. The inhibition of the coupled oxidation of the β-carotene / linoleic acid assay showed an important antioxidant activity of 79.10 for CrME, 73.37 for AqF, and 70.17 for the chloroformic extract (ChF). The ferrous ion chelating capacity test showed that the crude aqueous (CrAE), AqF and CrME extracts were the most active. Oral administration of (100, 300 and 600 mg/kg) of *Globularia alypum* L. extracts reduced the severity of gastric lesions induced by 70% ethanol in the mouse. These results show that this plant is a good source of antioxidant molecules and may explain in part, its pharmacological properties and its traditional therapeutic uses.

**Key words:** Antioxidant activity, ethanol, gastric ulcer, *Globularia alypum*, polyphenols.

1.27 Bioinformatic Analysis and Study of the Antiulcerous of an Active Principale Compared to Gastric Medicines

**DJALILA BOUDEMAH,** ¹ **ZAWANI M.** ², **VIJAY M.** ³, and **TAIBI BEN H.** ⁴

¹Département de Génie des Procédés, Université Ferhat Abbas de SETIF, Algérie. ²Ecole Nationale Supérieure Vétérinaire d’Alger-16000, Algérie. ³Department of Chemistry, Vidya Bharati College, Amravati, India- 444 602. Laboratoire Chimie des Matériaux, Faculté Sciences, Oujda-60000, Maroc.

**Abstract:** The anti-ulcer activity of active principle has been carried out in albino rats. First for all study on small groups of animals was conducted to know the approximate ulcer protective activity of the active principle compared to the different gastric medicines Maalox, Ranitidine and Omeprazole. Anti-ulcer activity for product was studied in rats, in which gastric ulcers induced by oral administration. The reduction of ulcer index as well as gastric out put in product treated animals was found to be statistically significant with respect to control animal. The average ulcer of control was found to be varied from (1.4 ± 1.14) to (0.2 ± 0.447) for a dose of 250 mg/kg. Thus results tend to confirm that the active principle has a preventive role in drug induced ulceration.

**Key words:** Anti-ulcer activity, gastric medicines, ulcer index.

1.28 The Antioxidant and Lipid Peroxidation Activities of Rubus idaeus L. Extracts

**Djamila AMENI**¹, **Abderrahmane BAGHIANI**², **Saliha DJIDEL**³, **Sabah BOUMERFEG**², **Seddik KHENNOUF**³ and **Lekhmici ARRAR**².

¹Department of Biochemistry, Faculty of Nature and Life Sciences, University Abderrahmane Mira Bejaia. ²Laboratory of applied biochemistry, Department of biochemistry, Faculty of Nature and Life Sciences, University Ferhat Abbas Setif. ³Laboratory of Phytotherapy applied to chronic diseases, Department of biochemistry, Faculty of Nature and Life Sciences, University Ferhat Abbas Setif, Algeria.
Abstract: Rubus idaeus L. shoots is used widely in the north of Algeria in folk medicine for its medicinal properties. The total phenolics and antioxidative proprieties of crude (CRE), chloroform (ChRE) and ethyl acetate (EARE) extracts of Rubus idaeus L. were determined by different in vitro model systems. The EARE contained relatively high levels of total phenolics as gallic acid equivalents; 174,54 ± 1,132 mg GAE/g extract, then that of CHERI; 29,77 ± 0,97 mg GAE/g extract, and CERI; 106,80 ± 1,11 mg GAE/g extract. In comparison with butylated hydroxyl toluene (BHT) (59,52 ± 2,16 %), at 2 mg/ml, the antioxidant activity, by linoleic acid peroxidation, was found to be highest with ChRE, followed by EARE and CRE. In β-carotene/linoleic acid bleaching assay, the CRE showed the highest antioxidant activity with 99,47 ± 0,10 %, followed by the EAREI and CHERI with 95,30 ± 0,38 % and 85,29 ± 3,51 %, respectively. The results showed that EARE had the highest antioxidant activity with an IC50 value of 0,0048 ± 0,0006 mg/ml for DPPH radical scavenging activity, 0,358 ± 0,003 mg/ml for hydroxyl radical scavenging activity and 0,593± 0,009 mg/ml for reducing power. In conclusion, the present results provide evidence that all extracts of Rubus idaeus acts as an antioxidant and inhibitor of lipid peroxidation.

Key words: Medicinal plants, Rubus idaeus L., Free radicals, Antioxidants, Lipid peroxidation

1.29 Evaluation of Activity Hypoglycemic and Anti-Hyperglycemic Aqueous Extract of Inula viscosa in the Rat with Induced Diabetes

1.30 Antioxidant Proprieties of Pistacia lentiscus I. Leaves Extracts

15
hydroxyl radical scavenging and reducing power with IC$_{50}$ value of 0.0068 ± 0.0013 mg/ml, 0.16 ± 0.0082 mg/ml and 1.55±0.025 mg/ml respectively. Using β-carotene/linoleic acid bleaching assay, crude extract had the highest antioxidant activity with 90 % inhibition. BHT was used as positive control in this test. In addition, the ethyl acetate and crude extracts exhibited lipid peroxidation inhibiting activity with 42.7% and 41%, respectively against the linoleic acid emulsion system. In conclusion, Pistacia lentiscus extracts contain high amounts of phenolic compounds and exhibited high antioxidant activity which is related to these compounds.

**Key words:** Antioxidant activity, free radicals scavenging activity, lipid peroxidation, Pistacia lentiscus L, polyphenols.

### 1.3.1 Antiplasmodial and Immunomodulating Activity of Some Sudanese Herbal Medicine with emphasis on Pristimerin as Antiplasmodial Agent

**EL Tahir A$^{1,2}$, SATTI G M H. $^1$, THEANDER T$^3$, CHRISTENSEN S B. $^3$, and KHALID S A.$^4$**

$^1$Faculty of Medicine, King Fahad Medical City, Kingdom of Saudi Arabia. $^2$Dept. of Biochemistry, Faculty of Medicine, University of Gezira, Sudan. $^3$Panum Institute, University of Copenhagen; $^4$Faculty of Pharmacy University of Khartoum.

**Abstract:** Sudan is the largest country in Africa, covering an area of one million square miles with different metrological and polyethnic, with a diverse flora. Most people in rural areas rely on traditional medicine for the treatment of many infectious diseases. WHO has recently advocated the use of traditional medicine where appropriate health services become inaccessible, therefore, the study aims to investigate the potential antiplasmodial, antileishmanial activity of some medicinal plants and to detect their effect on human lymphocytes proliferation which may imply the ability to potentiate the human immune system. Forty-nine plant parts representing 26 species from 15 families were extracted and screened for their activity on chloroquine sensitive strains 3D7 and Dd2. Plants were collected according to their traditional use and / or to their taxonomical affiliation to their families that had been reported to have antimalarial activity. Thirty-four methanol extracts (59%) exhibited significant activity against 3D7 with IC$_{50}$ values ≤ 50 μg/ml, while twenty-one extract (57%) showed antiplasmodial activity on Dd2 with IC$_{50}$ values ≤ 50 μg/ml. On the other hand, thirteen extracts (22%) and ten extracts (18%) only showed an activity with IC$_{50}$ values ≤ 5 μg/ml on 3D7 and Dd2; respectively. Human lymphocytes treated with the most of extracts demonstrated a minimum level of toxic inhibitory effect at concentration ≥ 100μg, whereas Sonchous cornatus, Balanites aegyptiaca, Acacia nilotica and Tamarindus indica enhanced lymphocytes proliferation. Bioactivity directed fractionation of the chloroform extract of the root bark of Maytenus senegalensis resulted in the isolation and characterization of the quinonemethide triterpene, (20α)-3-hydroxy-2-oxo-24-nor-friedela-1(10),3,5,7-tetraen-carboxylic acid - (29)- methylester (pristimerin). The structure was elucidated by spectroscopic techniques. The in vitro antiplasmodial activity of the isolated compound against chloroquine-resistant strain (Dd2) of Plasmodium falciparum was IC$_{50}$ = 0.5μg/ml and its in vitro antileishmanial activity performed on promastigotes of Leishmania major was IC$_{50}$ = 6.8 ± 0.8 μg/ml while the cytotoxicity on lymphocyte proliferation model was detected at IC$_{50}$= 6.8 ± 0.8 μg/ml. The promising response of Acacia nilotica and Mayenus senegalensis conclude that some Sudanese plants used in traditional medicine possess a potent antimalarial activity with minor effects on lymphocytes proliferation. These plants have been subjected to long-term clinical trials in folk medicine and hence we propose that these plants should be further investigated.

**Key words:** Antiplasmodial, immunomodulating activity, sudanese pristimerin.
1.32 Impact of Iron Overload in Drinking Water on Animal and Human Health in Dakahlyia Governorate, Egypt and Role of Catechins as Iron Chelator

F.A. Badria¹, R.A. Mandour² and A.A. Ghanem³

¹Pharmacognosy Department, Faculty of Pharmacy, Mansoura University ²Toxicology Unit, Emergency Hospital, Mansoura University ³Forensic Med. and Clin. Toxi. Department, Faculty of Medicine, Mansoura University.

Abstract: Water may be regarded as polluted if it contains substances that render it unsafe for public use. The surface, subsoil waters and the shallow water-bearing geologic formation are more subjected to pollution due to its closeness to the human daily work. For the present study, a total number of 144 drinking water samples (surface, wells and tap) have been collected during Nov, 2002 and Blood samples were carried out on (140) selected inhabitants who attended in different Dakahlyia governorate hospitals, from different localities and suffering from liver diseases, serum iron level in these patients was estimated. Moreover, 30 albino rats (divided into three groups of ten rats each) were subjected to analysis for iron biochemical (blood) and histopathology (tissue). The water samples analyzed for iron are found suitable for drinking except two samples at Mit-Ghamr district, showing values higher than the permissible limit of Egyptian Ministry of Health (EMH, 1995) and World Health Organization (WHO, 1984). The comparison between iron concentrations in drinking water and human blood samples shows a positive relationship, where the mean value of Fe is 3.150 mg/l and 0.149 mg/l for blood and water samples of groundwater origin respectively. Also the mean value of Fe is 2.270 mg/ l and 0.057 mg/ l for blood and water samples of surface water respectively. The results obtained were confirmed experimentally in iron-overload rats whereas the mean of iron level in both rat's liver and spleen were 17.35 µg / g and 39.3 µg / g respectively. Administration of a major component of green tea (catechin) led to decrease of iron levels in iron-overload rats in liver and spleen to 15.5 µg / g and 26.5µg / g respectively.

Key words: Catechins, drinking water, iron overload, liver.

1.33 Effect of Ethanolic Extract of Olive Leaves on Blood Glucose and Cholesterol Levels in Diabetic Rabbits

Firas alkazak¹, Assaad al-abd² and Talah Kanbar³

¹Department of Pharmacology and Toxicology, Faculty of Veterinary Medicine, Al Baath University. ²Department of Physiology, Faculty of Veterinary Medicine Al Baath University. ³Department of Pharmacology and Toxicology, Faculty of Veterinary Medicine, Al Baath University. Hama, Syria.

Abstract: The present study aims to investigate the effect of ethanolic extract of Olive leaves (Olea europaea L.) on blood glucose and cholesterol levels in diabetic rabbits. Diabetes was induced in rabbits by intraperitoneal injection of alloxan. The experiment was carried out on 36 rabbits of both sexes and weight between (2100g-2500g). The experimental animals were divided into 3 groups, each group consisting of 12 animals. The first group was left as control, while the second and third groups, they were rendered diabetic by intraperitoneal injection of alloxan (175 mg/kg b.wt.). The second group was left as diabetic control, while the third was treated with of the ethanolic extract of Olive leaves in a dose of 500 mg/kg b.wt./ day for 4 weeks. Blood samples were collected from the heart for determination of glucose and cholesterol levels. The results obtained show that oral administration of Olive leaves ethanolic extract high significantly decreased the high blood glucose and cholesterol levels of the treated diabetic rabbits, as compared to the diabetic control group. To conclude, it can be said that Olive leaves of ethanolic extract produces antidiabetic and hypocholesterol levels in alloxan–diabetic rabbits and it may be beneficial to help patients who suffer from diabetes mellitus.

Key words: blood glucose, cholesterol, olive leaves.
1.34 Anti-Inflammatory Effects of *Hypericum triquetrifolium* and *Peganum harmale*

Hadieh Bahaa¹, Abo Farich Basheer¹, Said Omar² and Saad Bashar¹,³

¹Al-Qasemi Research Center- Al-Qasemi Academic College, Israel. ²Antaki Center for Herbal Medicine Ltd, Kufur Kanna, Israel. ³Faculty of Arts and Sciences, Arab American University Jenin, P.O Box 240, Jenin, Palestine.

Abstract: Traditional therapies have been utilized by people in Mediterranean region who have faith in spiritual healers, homeopaths or even many herbalists. Arabic medicine had shown remarkable achievements in curing inflammatory diseases in general, and clearly distinguishing between several subtypes of inflammatory diseases and has offered tens of plants for treating various types of inflammations. Inflammation is the first response of the immune system to infection or irritation. It is caused by cytokines. There are two types of cytokines; pro-inflammatory and anti-inflammatory. Thus, inhibitors of the pro-inflammatory cytokines have been considered as a candidate of anti-inflammatory drugs. Lipopolyssacharide (LPS)-activated macrophages are usually used for evaluating the anti-inflammatory effects of various materials. LPS is a principle component of the outer membrane of Gram-negative bacteria, is an endotoxin that induces septic shock syndrome and stimulates the production of inflammatory mediators such as nitric oxide, tumor necrosis factor-α (TNF-α) and interleukins. Therefore, LPS plays a key role in not only eliciting an inflammatory response but also in causing septic shock during a Gram-negative bacterial infection. Inflammatory responses are advantageous for eradicating bacteria, as long as they are under control. When out of control, however, deregulated inflammation leads to the massive production of pro-inflammatory cytokines such as TNF-α and interleukin-6 (IL-6) by macrophages, which can cause tissue injury and multiple organ failure. The aim of the present in vitro study is to evaluate the role of pro-inflammatory cytokines tumor necrosis factor-α (TNF-α) and interleukin 6 (IL-6) in the observed anti-inflammatory effects of *Hypericum triquetrifolium* and *Peganum harmale*. Therefore, water extracts from the aerial parts of the two plants.

Key words: Anti-inflammatory, effects, *hypericum triquetrifolium*, *peganum harmale*.

1.35 Composition and Antioxidant Activity of Essential Oils from *Pituranthos scoparius* Growing in Algeria

Hakim kheniche¹, Tahar Smaili¹, and Amar Zellagui²

¹Life Science and Nature Department, Faculty of Science, University of M'sila. ²Laboratory of Biomolecules and Plant Breeding, Life Science and Nature Department, University of Larbi Ben Mhidi Oum El Bouaghi, Algeria

Abstract: The essential oil obtained by hydrodistillation of the flowers of *Pituranthos scoparius* (Coss. & Dur.) Benth.et Hook. (Apiaceae), an endemic species of North Africa, including Algeria, was analyzed by GC/MS. Thirty-one compounds were identified accounting for 99.3 % of the whole essential oil, mainly represented by monoterpenes, followed by phenylpropanoid derivatives. The main constituents of the essential oil were myristicin (24.1%), α-pinene (17.4%), α-phellandrene (15.6%) and sabinene (7.5%). The Antioxidant activity of oil was assayed spectrophotometrically using DPPH free radical.

Key words: Antioxidant activity, apiaceae, essential oil, myristicin, *Pituranthos scoparius*.  

18
1.36 Antimicrobial Activity of Phenolic Extract from *Teucrium Polium Geyrii* (Lamiaceae) Plant

HAMMOUDI Roukia, HADJ M. M., and RAMDAN Farah CHABROUK F.
Laboratoire de Biogéochimie des milieux désertiques, Université KASDI Merbah Ouargla

Abstract: In order to contribute to the well-known local medicinal plant valorization for their therapeutic virtues, we were interested in the survey of the plant *Teucrium polium geyrii* (lamiaceae). Phytochemicals screening had put in evidence various secondary metabolites: Tannins, Saponosids, sesquiterpenes, alkaloids, anthraquinons, stérols, flavonoids and polyphenols. The plant has been subject to two types of phenolic compounds extraction, the first was made by macerating, and the second by Soxhlet. The semi-quantitative analysis of the total phenols and flavonoids extracts carried out by colorimetry showed that the plant is very rich in phenolic compounds. The extract to the acetate ethyl gotten by macerating contains the biggest quantity of total phenols, 89.05 mg/g in equivalent of acidic Gallic, for the same reason as the rate of flavonoids with 0.45 mg/g in equivalent of vitexin. The antibacterial activity carried out on stumps pathogens and alteration bacterial, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Proteus mirabilis*, by the method of Aromatogramme shows that the tested extracts are endowed with interesting antibacterial activity with a maximum of inhibition 3.4 + / - 0.3 cm of diameter for butanolic extract on *Proteus mirabilis*.

Key words: Antibacterial, Aromatogramme, Medicinal plant, Phenolic, *Teucrium polium geyrii*.

1.37 Evaluation of Antioxidant Activity, Free Radical Scavenging and Cuprac of Three Compounds Isolated from *Scorzonera undulata* ssp *deliciosa*.

Harkati Brahim1,3 , Akkal Salah2, Bayet Christine3, and Dijoux-Franca M-G3.

1Département de sciences de la matière, Faculté de Sciences exactes, Sciences de la naturel et vie, Université de Tébessa . 2Université de Constantine, Laboratoire de Phytochimie et analyse physico chimiques et biologiques, Faculté des Sciences, 25000 Constantine, Algérie. 3Université de Lyon, UMR 5557 CNRS-UCBL, CESN, Département de Botanique et Pharmacognosie, Faculté de Pharmacie, 8 avenue Rockefeller, 69373 Lyon Cedex 08, France.

Abstract: Known for its medicinal, aromatic and culinary, the Asteraceae family has a major economic interest, such as source essential oils. As part of the study of biodiversity of flora Algerian, phytochemical analysis and research of biological activities of roots of *Scorzonera undulata* ssp *deliciosa* (Guss.) Maire were undertaken. Dichloromethane and methanol extracts led to the isolation of triterpenoid known compounds were also isolated: β acetate Amyrin, of them was known compounds (a mixture methyl Oleanate, methyl Ursolate and Stigmasterol, β-Sitosterol) of the and three phenolic derivatives among which two were new from the genus Scorzonera named: Galangustin and Acetoside and coumarin: Coumarin-O-β-glycoside. The structures and relative configurations of the compounds were elucidated by MS and a series of 1D and 2D NMR analyses. Three pure compounds (Galangustin, Acetoside and β acetate Amyrin) have been evaluated for their antioxidant activities through different methods: 1,1-diphenyl-2-picrylhydrazyl (DPPH) and cupric-reducing antioxidant capacity (CUPRAC) methods demonstrated important radical scavenging activity with the antiradical power (ARP) of 5 (in DPPH method), and trolox equivalent antioxidant capacity (TEAC) = 1.

Key words: Antioxidant activity, phenolic, Scorzonera undulata, triterpenoid.
1.38 Evaluation of the Antidiabetic Effect of the Aqueous Extract of A Medicinal Plant Used in Algerian Traditional Medicine: *Rubus fruticosus*.

HENCHIRI C., BOUASLA, A., and DERRADJ M.
Laboratoire de Biochimie et de Microbiologie Appliquées. Faculté des Sciences. Université Badji Mokhtar, Annaba (Algérie).

Abstract: This study aimed to demonstrate the supposed anti-diabetic effect of aqueous extract of the berries of *Rubus fruticosus*, botanical species of the Rosaceae family. The experiments were conducted on Wistar rats with Alloxan induced diabetes. For that 30 male rats were divided into six groups of five rats: a healthy control group and an untreated diabetic rats, have received distilled water, a diabetic group treated with glibenclamide (3mg/kg), two diabetic groups have traited with the aqueous extract at 200 and 400 mg / kg body weight orally and twice daily for 21 days. The results of biochemical analysis of blood after sacrifice, showed in the untreated diabetic group: hyperglycemia, hypercholesterolemia, hypertriglyceridemia accoed by a decrease in total protein, increased levels of urea and the change of the enzyme activity GOT, GPT, as well as alkaline phosphatase. The histology of the pancreas showed atrophy in the islets of Langerhans characterized by necrosis. Meanwhile, the administration of aqueous extract caused a decrease dose-dependent blood glucose accompanied by a regulation of lipid profile, protein and activity of transaminases and alkaline phosphatase; the results obtained with the 400 mg / kg b.w. are similar to those obtained with the drug (glibenclamide). A phytochemical study was also conducted; she was able to detect bioactive following groups: Flavonoids, Saponins, Tannin, Sterol and Terpenes

Key words: Alloxan, antidiabetic effect of plants, diabetes, medicinal plants, Rubus fruticosus.

1.39 Natural Products As Lead Structures for the Discovery of New Anticancer Agents

Hohmann, Judit
Institute of Pharmacognosy, University of Szeged, Szeged, Hungary.

Abstract: Plants or plant extracts have a long history of use in the treatment of cancer and these substances play a crucial role as a source of effective anticancer therapy. Natural compounds have a significant contribution to the success of cancer chemotherapy today, and many compounds are under clinical evaluation or are promising drug candidates as enhancer the antitumor activity of chemotherapeutic drugs by inhibiting multidrug resistance of cancer cells. The aim of our research program was the isolation and identification of natural compounds, especially from species of the Hungarian flora, in order to find promising lead compounds and scaffold for drug discovery and development. A broad screening program was recently made by our workgroup testing about 700 plant extracts prepared from more than 100 species of Asteraceae, Polygonaceae, Euphorbiaceae, Rutaceae and Lamiaceae family on human cancer cell lines (HeLa, MCF-7, A431) for tumour cell growth inhibitory effect. The highly active extracts from this screening (e.g. Centaurea, Achillea, Artemisia, Euphorbia, Conyza, Anthemis, Tamus, Sprekelia and Ruta species) were selected for bioactivity-guided isolation using solvent-solvent partition, CC, VLC, CPC, MPLC and HPLC techniques. The structures of the pure compounds were determined by means of 1D- and 2D-NMR and MS spectral analyses, and then the compounds were subjected to antiproliferative assay. The tumour cell selectivity of cytotoxic compounds, which is a critical pharmacological feature of new anticancer drug candidates, was assayed on non-cancerous cells (MRC-5). The final result of these phytochemical works was the identification of a set of effective, and previously unknown or poorly characterised compounds belonging mainly to the group of alkaloids, flavonoids, lignans, phenanthrenes and terpenoids. Many isolated compounds were investigated for multidrug resistance reversing activity, too. The inhibition of ABC transporters responsible for MDR of cancer cells is a particularly important effect of the compounds because the efflux inhibitors applied in combination with anticancer agents may reverse the chemotherapy resistance of various types of tumour cells. Our experiments reveal that some of the compounds can serve as adjuvant to current chemotherapy in as much as they
reverse MDR of cancer. This lecture will highlight our laboratory’s recent work on the bioassay-guided isolation of antitumor natural products from Hungarian plants, and a discussion about future perspectives of antitumor natural product research will also be included.

**Key words:** Asteraceae, cancer, euphorbiaceae, Lamiaceae, natural compounds, polygonaceae, rutaceae.

### 1.40 Evaluation of the Ex Vivo Antimalarial Activity of Guava Leaf Extract *(Psidium guajava)* on Erythrocytes Infected-*Plasmodium berghei* NK 65

**Ishak Shafariatul Akmar and Ariffin Noraniza**

*Program Of Biomedical Science, Academic Centre Of Applied Science And Diagnostic Science, Faculty Of Health Sciences, National University Of Malaysia, Kuala Lumpur*

**Abstract:** Malaria is the most destructive and dangerous parasitic disease. The burden of this disease is getting worse, mainly due to the resistance of *Plasmodium falciparum* against most of the current antimalarial drugs. Therefore, the search for new antimalarial drug is urgently needed. Thus, in this studies extract of *Psidium guava* leaves seems to be promising for treatment of malaria infections. Crude extracts of guava leaves were prepared according to method known as cold extraction using different solvent polarity which are hexane, etil asetat, aseton and methanol. These extracts were evaluated against infected erythrocytes with *Plasmodium berghei* NK65. The Plasmodium Lactate Dehydrogenase (pLDH) assay was employed for determination of the antimalarial activity (IC\textsubscript{50}) after 24 hours treatment at concentration range of 10-0.0000001 mg/ml. *Plasmodium berghei* NK65 was also cultured in synchronization process to produce a specific stage of morphology of trophozoite and schizont. Initially the study was done for screening most effective solvent at parasitemia of 10%, the result showed that methanol extract was the most effective which IC\textsubscript{50} is 4.270 mg/ml approximately to IC\textsubscript{50} values of the gold standard chloroquine drug which is 3.080 mg/ml. To prove it, one way ANOVA statistical test are used and results showed no significant differences between them as such F (1, 18) = 1091, p> 0.05 (0.310). The methanol extract of guava leaves also were treated on erythrocytes infected *Plasmodium berghei* NK65 at different level of parasitemia which are 5%, 10% and 30%. The degrees of parasitemia represents the severity parasite infection inside the body of an individual as well. The study found that malaria inhibitory activities effectively in parasitemia of 10% and it is not significantly different to the chloroquine F (1, 18) = 0797, p> 0.05 (0.384). Finally, the synchronization process was carried out by using the sorbitol lysis method where it lysed most of the malarial stage except the ring form (early trofozoit) and then the ring form were cultured in complete media for 24 hours in order to obtained the trofozoites and schizont form. Results demonstrarted that in the ring form (early trofozoit), IC\textsubscript{50} is 0.0001 mg/ml whereas late trofozoit and skizon showed similar IC\textsubscript{50} value which is 4.276 mg/ml 4.295 mg/ml. In conclusion, guava leaf extract methanol showed the potential of anti-malarial agent.

**Key words:** Malaria, *Plasmodium berghei*, *Psidium guajava*, synchronization.

### 1.41 Antioxidant Activity of Aqueous Tea Extracts

**KAABOUR Faiza, BELAMBRI Sahra Amel, BOURICHE Hamama, and SENATOR Abderrahmene.**

*Laboratory of Applied Biochemistry, Department of Biochemistry, Faculty of Nature and Life Sciences, Ferhat Abbas University, Setif, 19000, Algeria.*

**Abstract:** Overproduction of reactive oxygen species (ROS) during oxidative stress is involved in development and progression of many diseases such as inflammation, cardiovascular diseases and aging. The most widely used synthetic antioxidants in food industry such as BHT (butylated hydroxytoluene), BHA (butylated hydroxyanisole) and PG (propyl galate) have been suspected to cause or promote negative health effects. So, there is a growing interest to study natural products, since they contain a wide variety of compounds which provide protection against harmful free radicals. Tea derived from leaves of *Camellia sinensis* is the most popular drink over the world. Traditional medicine has recommended this plant for headaches, body aches, digestion, and
general pain. It can be used as beverage, mouth wash, local drug delivery or chewing gum. The aim of this study is to investigate the antioxidant effect of aqueous green tea extracts. Infusion and decoction are used to obtain water extracts from green tea leaves. Moreover, the DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging assay, the β-carotene bleaching test and the ferrous ions chelating assay are applied to evaluate the antioxidant activity of the extracts. The obtained results show that both tea extracts have exhibited a strong scavenging effect on DPPH radical comparable with ascorbic acid (reference antioxidant) with an IC\textsubscript{50} of 3µg/ml. The maximum of inhibition reached 88%. Our results also indicated that 88% and 93% of linoleic acid oxidation was inhibited by tea extracts prepared by infusion and decoction respectively. These results are similar to those exhibited by the standard antioxidant (BHT) which produce an inhibition percent of 96%. In terms of FIC ability, the two types of tea extracts produced a good chelating power on Fe\textsuperscript{2+} with chelating level of 75%. Infusion and decoction extracts have the same antioxidant activities without significant differences. The present study provides additional data for supporting the use and consumption of aqueous green tea extracts as natural antioxidant agents.

Key words: Antioxidant activity, oxidative stress, tea.

1.42 Greco-Arab-Based Medicinal Plants Diminishe Insulin Resistance in Skeletal Muscle Cell Line

Kadan Sleman\textsuperscript{1,2}, Saad Bashar\textsuperscript{1,3}, Kmail Abdalsalam\textsuperscript{3}, Khasib S\textsuperscript{3}., and Zaid H.\textsuperscript{1,3}

\textsuperscript{1}Qasemi Research Center- Al-Qasemi Academic College, P.O Box 124, Baqa El-Gharbia 30100. 
\textsuperscript{2}Casali Institute for Applied Chemistry, Faculty of Mathematics and Sciences, The Hebrew University of Jerusalem, 
\textsuperscript{3}Faculty of Arts and Sciences, Arab American University Jenin, P.O Box 240, Jenin, Palestine.

Abstract: Hypoglycemic herbs are widely used as non-prescription treatment for diabetes (mainly type II). Palestinian herbs have been used for hundreds of years in treatment and prevention of diverse diseases including diabetes. However, Palestinian herbal anti-diabetic medicines action mechanisms are not well characterized as those of Western drugs. This study aimed at investigating safety and efficacy of one of these plants that is still in the process of patenting it; herein named HIBAS. The largest site for glucose disposal in the mammalian body is skeletal muscle, and Glucose Transporter-4 (GLUT4) is the major glucose carrier in muscle mediating most of the glucose influx. Insulin triggers GLUT4 translocation to the plasma membrane, where it can mediate glucose influx into the cell. Here, we focused on identifying the mechanism of action of HIBAS in curing insulin resistance (type II diabetes) in an in-vitro skeletal muscle cell line model by detecting the relative amount of GLUT4 on the plasma membrane. We had also tested the toxicity of the HIBAS leave extracts (50% H\textsubscript{2}O, 50% Ethanol) on human fibroblasts and skeletal muscle cells. No sign of toxic effects were seen in cultured human fibroblasts and skeletal muscle cells treated with increasing concentrations of the Plant mixture up to 1mg/ml. Anti-diabetic effects were evidenced by measuring the relative amount of GLUT4 translocation to the plasma membrane in the presence and absence of insulin. Skeletal muscle (L6) cells stably expressing myc-tagged GLUT4. have been repeatedly shown to display insulin regulated GLUT4 traffic. HIBAS led to increase in surface GLUT4myc when L6 myoblasts were pre-treated with increasing concentrations of the plant extract for 20h, followed by 3h serum-deprivation and insulin stimulation for 20 min. Exposing L6 muscle cell cultures to high glucose and high insulin (25 mM, 100 nM, respectively, for 24h), followed by 3h in control medium, renders them refractory to subsequent acute stimulation by insulin. This experimental paradigm has also been tested. Consistent with the previous finding, 0.5mg/ml of HIBAS for 3h was able to overcome the induced Insulin insensitivity. Collectively, our results demonstrate safety, tolerability and efficacy of a herbal Palestinian plant that seems to be safe for use and regulates glucose homeostasis.

Key words: Diabetes, insulin triggers, mechanism, myoblasts, Palestinian herbs.
1.43 Polyphenols and Antioxidant Properties of Extracts from Mentha pulegium L. and Matricaria chamomilla L.

KHENNOUF Seddik¹, DJIDEL Saliha¹, BENCHIEKH Dalila¹, DAHAMNA Saliha¹, CHAREF Noureddine², BAGHIANI Abderahmane¹, HARZALLAH Daoud³ and ARRAR Lekhmici²

¹Laboratory of phytotherapy applied to chronic diseases. ²Laboratory of applied biochemistry. ³Laboratory of applied microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbas, Setif, 19000, Algeria.

Abstract: This study was carried out to determine the antioxidant activity of Mentha pulegium L and Matricaria chamomilla L extracts. The methanolic extract (MeE) of Mentha pulegium L gave the higher yield (14, 4%) of extraction. Whereas the aqueous extract (AqE) of Matricaria chamomilla L had the highest yield (18, 56%) of extraction. Moreover, the ethyl acetate extract of Mentha pulegium L contains high amount of total polyphenols; tannins and flavonoids (191,99µg gallic acid equivalent/g; 265,33µg tannic acid equivalent/g; 110,37µg quercetin equivalent/g and 151,11µg rutin equivalent/g) respectively. This extract possessed high antioxidant activity (IC₅₀=0,017mg/ml) in DPPH assay while the chloroformic extract (ChE) of this plant was stronger in the β carotene/linoleic acid assay. On the other hand, the ChE of Matricaria chamomilla L contains the higher value of flavonoids (197,43µg quercetin equivalent/g; 273,03 µg rutin equivalent/g) whereas total polyphenols were higher in MeE (299,14µg gallic acid equivalent/g) and ChE showed high tannin values (245,11 µg tannic Acid equivalent/g). Matricaria chamomilla extracts exerted high DPPH scavenging activity and a moderate antioxidant action in the β carotene/linoleic acid assay. It was concluded that the therapeutic use and biological activities of these plants could be attributed to phenolic compounds and its free radicals scavenging and antioxidant properties.

Key words: Antioxidant activity, β-carotene, flavonoids, Matricaria chamomilla, polyphenols, PPH, tannins.

1.44 Antifungal and Antibacterial Properties of Three Medicinal Plants from Malaysia

Khoo, Kong Soo¹ Gwee, Pei Shing², Chen, Li Wen², Tan, Syu Wei², Ong, Hean Choo³, and Sit, Nam Weng²

¹Department of Chemical Science, Faculty of Science, Universiti Tunku Abdul Rahman, Jalan Universiti, Bandar Barat, 31900 Kampar, Perak, Malaysia. ²Department of Biomedical Science, Faculty of Science, Universiti Tunku Abdul Rahman, Jalan Universiti, Bandar Barat, 31900 Kampar, Perak, Malaysia. ³Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.

Abstract: The increase of opportunistic fungal infections and the escalation of bacterial resistance, particularly multi-drug resistance have seriously impacted the chemotherapeutic agents available today. Thus the search for new antimicrobial agents from natural sources such as medicinal plants becomes necessary. Plants that are consumed as vegetables or used in traditional medicine in Malaysia were investigated for this purpose. The aerial parts of Diplazium esculentum (“vegetable fern”) and Sechium edule (“chayote” or “vegetable pear”), and the fruits of Solanum muricatum (“sweet pepino” or “melon pear”) were used, and extracted sequentially using hexane, chloroform, ethyl acetate, ethanol, methanol, and water. The extracts were then evaluated, in triplicate, against a panel of 12 medically-important microorganisms (two Gram-positive bacteria, four Gram-negative bacteria, four yeasts and two molds) for microbiostatic and microbiocidal activities using colorimetric broth microdilution methods. Amphoterin B and chloramphenicol was used as the positive control for fungi and bacteria, respectively. Following extraction, the total percentages of yields obtained were 1.20%, 1.84% and 3.53% (w/w, based on fresh weight) for D. esculentum, S. edule and S. muricatum, respectively. All the plants showed antifungal activity with 66% and 49% of the bioassays demonstrated fungistatic and fungicidal
activity, respectively. Two yeasts, Cryptococcus neoformans and Issatchenka orientalis were found to be 100% susceptible to all the plant extracts with the MIC values ranging from 0.08 to 2.50 mg/mL. The lowest minimum inhibitory concentration (MIC) and minimum fungicidal concentration was exhibited by the hexane extracts of S. edule and S. muricatum against C. neoformans, both with values of 0.08 mg/mL. In the antibacterial screening assays, 49% of the bioassays exhibited bacteriostatic activity while only 21% of them showed bactericidal activity. The lowest MIC and minimum bactericidal concentration was recorded for the hexane extract of S. muricatum against Bacillus cereus and Klebsiella pneumoniae, both with values of 0.31 mg/mL. The susceptibility of bacteria towards the plant extracts evaluated was species-dependent, with the susceptibility indices ranging from 0% for Escherichia coli to 72% for Pseudomonas aeruginosa. The results from this study show that extracts from these plants have significant antimicrobial activity, which corroborates their use in traditional medicine.

Key words: Bactericidal, bacteriostatic, broth microdilution, extraction, fungicidal, fungistatic.

1.45 Application of Citrus aurantifolia to Control Streptococcus agalactiae Infection in Nile Tilapia, Oreochromis niloticus

Kitancharoen, Nilubol1., Duadin, A.1., and Hanjavanit, Chutima2
1Department of Fisheries, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002 Thailand. 2Department of Biology, Faculty of Science, Khon Kaen University, Khon Kaen 40002 Thailand.

Abstract: Effectiveness of Citrus aurantifolia to control Streptococcus agalactiae infection in Nile tilapia was investigated, including its impacts on tilapia growth rate and histopathological changes. Concerning tilapia growth rate, the fish with 50±0.12 g BW were fed with pellet feeds containing 2.5, 5.0 and 10.0% of C. aurantifolia juice for 2 mo. The results showed that specific growth rate of fish fed with the 3 concentrations of C. aurantifolia juice were significantly higher than those of the control group (p<0.05). Among the experimental groups, the fish fed with pellet feeds containing 5% C. aurantifolia juice showed the highest average specific growth rate. The experimental group fed with C. aurantifolia juice and the control group appeared non-significantly different on hematocrit index (P>0.05). On investigation of diseases control, S. agalactiae KKK 02057 were intraperitoneally injected into the fish at a dosage of 0.1ml/100g fish and observed mortality for 14 d. The fish fed with C. aurantifolia juice showed significantly higher survival rate than the control group (p<0.05). The fish fed with 5.0 and 10.0% C. aurantifolia juice appeared 100% survival rate, whereas the control group showed 18.33% survival rate. From histological observation, there were histological changes of gill in some control and tested fish appeared disarray, fusion, aneurysm and club shape of some gill lamellae. The pathological changes might respond to an ectoparasitic infestation on gill filaments. There were no pathological changes of livers and kidneys of both control and experimental groups.

Key words: Citrus aurantifolia, infection, nile tilapia, Streptococcus agalactiae.

1.46 Hintonia latiflora Bark Extract: Open Clinical Study in Type 2 Diabetes Mellitus

Korecova Marta1 and Hladikova Marie2
1Head of Diabetes Department, IDF President, Rc: 425201/734, Vel’komoravská 2, 91101 Trencin, Slovak Republic. 2Department for Medical Informatics, 2nd Medical Faculty of Charles University Prague, V Úvalu 84, 15006 Praha 5, Czech Republic.

Abstract: Extracts from the bark of Hintonia latiflora are used in the context of dietetic measures for the regulation of glucose metabolism and for the stabilization of blood sugar values. A dry concentrate from the bark of Hintonia latiflora in capsule form was tested in an open, prospective clinical study in 41 dietetically stabilized persons with type 2 diabetes. The effects on parameters
of blood sugar control were documented over a period of six months. Fasting and postprandial glucose and the HbA1c value declined significantly. In the case of HbA1c, this meant a reduction of the absolute value from 7.49 ± 0.72% to 6.82 ± 0.67% (from 58.4 to 51.0 mmol/mol Hb; ITT population). Furthermore, cholesterol and triglycerides were slightly reduced, and no negative effect on other laboratory parameters and no change of the liver values was observed. The tolerance was very good. In particular, no side effects and no hypoglycaemic episodes or worsening of diabetic symptoms occurred. The study confirms the positive effect of extract preparations from the bark of Hintonia latiflora on the blood sugar values. This provides a possibility of positive regulation of glucose metabolism in cases of mild type 2 diabetes.

Key words: Bark extract, clinical study, diabetes mellitus, Hintonia latiflora.

1.47 Antioxidant Activity of Essential Oils Isolated from Selected Algerian Medicinal Plants

KRAOUCHE Née KHEYAR N., KHARFALLAH Y., and BEJOU F.
Laboratoire de Biologie moléculaire, Département de Biologie Physico-Chimique, Faculté des Sciences de la Nature et de la Vie, Université Abderrahamane Mira de Bejaia, Algeria

Abstract: The human body produces reactive oxygen species (ROS), such as superoxide anion radical, hydroxyl radical and hydrogen peroxide by many enzymatic systems through oxygen consumption. In small amounts, these ROS can be beneficial as signal transducers and growth regulators. However, during oxidative stress, large amounts of these ROS can be produced and may be dangerous because of their ability to attack numerous molecules, including proteins and lipids. To address these deleterious oxidative products, the human body has an arsenal of defense termed antioxidants. In addition, many molecules of natural origin (phenolic compounds, alkaloids, essential oils,...) or from organic synthesis (Trolox, BHA, BHT, ...) are studied for their antioxidant properties and their contribution the fight against invasive species oxidant in the body. In this study, essential oils of Inula viscosa, Salvia officinalis and Laurus nobilis have been evaluated in vitro for their antioxidant activity, that were conducted by four complementary methods: scavenging activity against the diphenyl-picrylhydrazyl (DPPH) radical, Trolox Equivalent antioxidant Capacity (TEAC) or inhibition of radical (ABTS • +), H2O2 scavenger activity and estimation of reducing power. Our results indicate that Inula viscosa oil exhibited high scavenging activity against the three radicals DPPH, ABTS and H2O2, followed respectively by those of two species Salvia officinalis and Laurus nobilis. Other share, the species L.nobilis presents the reducing activity most significant. These variations can be allotted to the chemical composition of oils tested. The results of the chemical analysis of the composition of oil Inula viscosa by gas chromatography indicate the richness of the latter in the thymol (6.93%) and carvacrol (2.27%), could be at the origin of the results observed. These results highlight the various therapeutic applications of these plants in traditional medicine and like food spices and stimulate research of novel natural molecules with antioxidant and anti-bacterial in several industrial fields: pharmacological, cosmetic, food, etc.

Key words: Essential oils, Inula viscosa, Salvia officinalis, Laurus nobilis, antioxidant, gas chromatography.

1.48 Topical Symphytum Herb Concentrate Cream in the Treatment of Muscle Pain: A Subgroup Analysis According to Origin of Pain

Kučera, Miroslav1 and Hladikova, Marie2
1 Department of Sports Medicine and Rehabilitation, 2nd Medical Faculty of the Charles University Prague, V Úvalu 85, CZ-15006 Praha 5, Czech Republic. 2 Department for Medical Informatics, 2nd Medical Faculty of Charles University Prague, V Úvalu 84, 15006 Praha 5, Czech Republic.

Abstract: The efficacy of a topical cream preparation with a concentrate from the aerial parts of medicinal comfrey (Symphytum × uplandicum Nyman) had been tested in a randomised double-blind clinical trial in 215 patients with muscle pain caused by blunt traumas. The reference preparation in this trial was a low-dose, but otherwise identical preparation (1 % comfrey
concentrate; n = 111 versus 10 %; n = 104). The study duration was 8-10 days, with the primary parameter (pain on active motion) tested on day 4-5. The application of the higher concentration resulted in a significantly better and clinically highly important reduction of pain, as compared with the reference preparation. The origin of pain was more closely inspected in a subgroup analysis, differentiating pain caused by muscle overload (n = 135; of which n = 56 using verum) from muscle pain caused by blunt macrotraumas (n = 75; of which n = 47 using verum). Five patients with pain of other aetiology were not included. As in the original study, the primary statistical parameter was the assessment of pain on active motion on study day 4-5, measured through a visual analogue scale. A statistically highly significant advantage for verum over reference was found for both types of pain on study day 4-5 (t-Test, p ≤ 2·10^{-5}). Pain on motion was reduced for verum versus reference by 62.5 % versus 19.9 % in cases of muscle overload, and by 61.8 % versus 27.7 % in cases of blunt macrotraumas. At the same time a significantly faster onset of pain relief was registered with verum (75.0 % versus 40.5 % quick and very quick onset in cases of muscle overload, and 76.6 % versus 42.8 % in cases of blunt macrotraumas; Mann-Whitney-Test, p ≤ 4·10^{-3}). Topical Symphytum herb concentrate is efficacious against muscle pain originating from muscle overload as well as from blunt macrotraumas, with a quick onset of pain relief. The effect size must be considered clinically highly important.

Key words: Concentrate cream, muscle pain, symphytum herb, treatment.

1.49 Antioxidant Activity of Extracts of *Fraxinus angustifolia*

Laib Yasmina, Sebaihi S., Remila S., M., Chafer N., Debeche N., Ayouni K., Berboucha M., Boudaoud H., Atmani D. and Atmani D.

Laboratory of Applied Biochemistry; University of Bejaia, Algeria.

Abstract: In the present work, we studied the anti-radical effects of extracts of *Fraxinus angustifolia*, a plant used locally to treat numerous inflammatory-related pathologies. Results concerning phenol analysis showed different rates, the richest in total phenols and Flavonoids with respective values of 249.01 mg CatEq/g of extract and 169.53 mg RtEq/g of extract is the ethyl acetate extract of leaves and the richest in tannins is the ethanol extract of bark (990.4 mg TAEq/g of extract). At a concentration of 100 µg/ml, the ethanolic leaf extract exhibited the best activity against OH (65.68%, IC50 = 79.76µg/ml), higher than that of the standards of which the best (catechin) showed a rate of 37.85%. Evaluation of anti-DPPH activity at a concentration of 100µg/ml proved that bark extracts showed very important activity which is higher than 94%. Results of anti-H2O2 indicate that all extract showed a high activity around 70% at 100 µg/ml; the ethyl acetate extract of leaves showed the most important scavenging effect against this radical, with an IC50 of 51.79µg/ml. Analysis using column chromatography revealed two active fractions: polar F2 eluted with a mixture of ethyl acetate/methanol and F1 less polar eluted with chloroform. Analysis of these fractions using thin layer chromatography showed that the anti-radical effect could be probably due to the presence of rutin and tannic acid derivatives in the case of F2 of leaf extracts and to rutin and quercetin for F2 and F1 of bark extracts. Bark F1 revealed the presence of complex molecules with high molecular weight having an important anti-radical effect which remains to be identified and exploited in therapy.

Key words: Antioxidant, anti-radical, chromatography, *Fraxinus angustifolia*.

1.50 Chemical and Biological Study of Essential Oils of Two Populations of Algerian *Daucus setifolius*

Laouer Hocine¹, Bouheda Amina¹, Bouchekrit Moufida¹, Boulachaab Nacira, Sahli Farida and Akkal S².

¹Laboratory of natural resources valorization, University of Setif, Algeria. ²Department of chemistry, University of Mentouri, Constantine, Algeria.

Abstract: The composition of the essential oils of the aerial parts of *Daucus setifolius* (Apiaceae), obtained by hydrodistillation, collected from two site in Algeria (Bejaia and Skikda), was analyzed by GC and GC/MS. The yields of essential oils were varying from 0.3 % (Skikda) to
0.5% (Bejaia). The main constituents of the essential oil from Bejaia aerial part were β-pinene (41.1%), sabinene (38.4%) and α-pinene (4.6%), and those from Skikda aerial part sabinene (37.6%), β-pinene (28.6%) and α-pinene. The essential oils of these two populations are largely dominated by sabinene and β-pinene. The antimicrobial and antioxidant activities were also carry out.

Key words: Algeria, antimicrobial, antioxidant, Daucus setifolius, chemical composition, essential oils, sabinene.

1.51 In vitro Antimicrobial Activity of Crude Extracts and Their Liquid Fractions Obtained From Three Lichen Species in Jordan

Leena Abu-Eraq, Ghassan Kanan and Ahmad El-Oqlah
Biology Department, Yarmouk University, Irbid-Jordan.

Abstract: The antimicrobial activities of ethanolic and methanolic crude extracts of three lichen species, Tornabenia atlantica, Physconia venusta and Xanthoria parietina, as well as liquid fractions of Tornabenia atlantica, were investigated using agar well diffusion and agar amended methods. The ethanolic crude extract of Tornabenia atlantica was shown to be the most effective extract against Bacillus cereus, Staphylococcus aureus and Klebsiella pneumonia at 1500 μg/mL. Minimal Inhibitory Concentration (MIC) values of 700, 1700 and 2000 μg/mL respectively were required in order to inhibit their growth. Furthermore, ethanolic crude extract of Physconia venusta showed high activity at 1500 μg/mL against Staphylococcus lentus and Micrococcus luteus. MIC values of 1000 and 1400 μg/mL were required to achieve complete inhibition of bacterial growth. Moreover, methanolic crude extract of Xanthoria parietina was shown to be the most effective against Staphylococcus epidermidis where similar inhibition zones (mm) of 13.67±1.15 were generated at 800 and 1500 μg/mL. The MIC value obtained against Staphylococcus epidermidis reached 3000 μg/mL. In addition, the methanolic extract of Physconia venusta showed antifungal activity against Aspergillus nidulans, Candida albicans, Penicillium italicum, Penicillium digitatum, Aspergillus niger (mutant) and Penicillium chrysogenum. These fungal species (with the exception of Candida albicans MIC = 2000 μg/mL) required MIC values greater than 12 mg/mL in order to be completely inhibited. Moreover, all liquid fractions of Tornabenia atlantica showed high activity against the fungi. The only exception was the activity obtained against Candida albicans. Phytochemical screening of Tornabenia atlantica fractions revealed the presence of alkaloids in methanolic and hexane fractions of methanolic crude extracts, aqueous and methanolic fractions, and aqueous and methanolic fractions of ethanolic crude extracts. Flavonoids were detected in the aqueous and methanolic fractions of methanolic crude extracts of Tornabenia atlantica and in the aqueous, methanolic and hexane fractions of ethanolic crude extracts. Thin layer chromatography analysis indicates the presence of lichen acids such as usnic acid.

Key words: Antimicrobial activity, crude extracts, in vitro, Jordan, lichen species.

1.52 Antioxidant and Polyphenol Oxidase Activity of Some Tunisian Pearl Millet (Pennisetum glaucum L. R.Br.) Ecotypes

Leila Radhouane
radhouane.leila@iresa.agrinet.tn, Tunisia.

Abstract: Pearl millet, like others cereals, in addition to being primary sources of carbohydrates, also provide trace minerals, dietary fibre and bioactive compounds. It has health-promoting properties, in particular its antioxidant activity. It's used as nutraceuticals and as functional foods. It's also a potentially important source of polyphenol and cholesterol-lowering waxes and could serve as an important source of phytochemicals. Many autochthonous pearl millet ecotypes have generated interest in Tunisian because of their nutritional qualities. In order to provide information on the composition of pearl millet grown under local conditions, seven ecotypes were analyzed to evaluate phenolic compounds. Polyphenol oxidase (PPO) activity was also investigated and correlated to the total phenolic content and antioxidant potential. Results showed that Total phenolic content (TPC) in whole pearl millet ecotypes varied significantly among ecotypes.
highest TPC was observed in HZ ecotype with 323 mg/100g (mg equivalent of gallic acid (GAE)/100g) while BG showed the lowest TPC (198mg GAE/100g). The antioxidant activity of pearl millet flour significantly varied among ecotypes and ranged from 10.7% to 25.5%. Pearl millet ecotype (HZ) showed the highest antioxidant activity while (BG) ecotype exhibited the lowest. Therefore, pearl millet holds a good potential as a source of bioactive components. Research on endogenous bioactive components such as phenolic compounds will contribute to unleash the capacity of pearl millet to be the cornerstone of food security in Tunisia as well as in many developing countries.

**Key words:** Antioxidant, cholesterol, Pearl millet, polyphenol.

### 1.53 Study of Extracts Plants on Crystallisation Calcium Phosphate Stones Urinary In Vitro

**M. Beghalia**$^{1,2}$, **S. Ghalem1, H. Allali**$^1$, **A. Belouatek**$^2$, **H. Allali**$^1$

$^1$LASNABIO. Department of Chemistry, Faculty of Sciences, University Aboubekr Belkaïd BP 119, Tlemcen, Algeria. $^2$University Centre of Relizane, Algeria.

**Abstract:** In this work, we performed an in vitro crystallization study enabling the specification of kinetic and thermodynamic conditions of formation and growth of crystalline calcic phosphates species by . We used inhibitors, which are medicinal plants which prevent, slow down or reduce crystallization phases. We chose the classical model for the study of phosphate crystallization without inhibitor and with it, in order to assess the inhibiting capacity of any chemical species used. The precipitation of the solid phase of phosphates from artificial urine. The crystal size development was monitored by polarized microscopy at different time intervals. After crystallization time, the mixture was filtered, the recovered dried precipitates were analysed by FTIR spectroscopy and X-rays diffraction technique and chemical analysis. In the absence of inhibitor, the crystallization of phosphates led to the formation of struvite and amorphous carbonated calcium phosphates (ACCP), after 6 hours. In presence of inhibitor, at lower concentrations of plant inhibition was partial. The addition of 1 ml of extract plant to the mixture decreases the size of crystal, after 4 hours the size of crystals stabilized at 20.67 μm. The complete disappearance of struvite crystals was obtained after addition of 10mL of inhibitor plant, only Pentahydrated octocalcic phosphates (POP) and ACCP were formed. In the presence of other inhibitor extract plant, the inhibition of struvite growth and aggregation increased. The addition of up to a volume of 20 mL of the second inhibitor resulted in total inhibition and crystalline transformation of the ACCP into carbapatite (CA). Phosphate compounds encountered in urine can be dangerous and the use of inhibitors to prevent, slow down or reduce crystallization phases might be very helpful. In this investigation, extracts plants proved to be good inhibitors. Their effect increases with solution pH but they are more efficient in less acidic or neutral urine than in alkaline one.

**Key words:** Crystallization, inhibition; IR, medicinal plants, struvite.

### 1.54 The Anti-Psoriatic Effects of *Hypericum triquetrifolium* and *Peganum harmala* -Derived Factors are Mediated by Down Regulation of Pro-inflammatory Cytokines and up Regulation of Apoptosis

**Mahajna Shihnaz**$^1$, **Hadieh Bahaa**$^1$, **Zaid Hilal**$^1$, **Abo Farich Basheer**$^1$, **Soroka Yoram**$^3$, **Said Omar**$^2$ and **Saad Bashar**$^{1,4}$

$^1$Al-Qasemi Research Center- Al-Qasemi Academic College. $^2$Antaki Center for Herbal Medicine Ltd, Kufur Kanna. $^3$The Dead Sea Laboratory for Skin Biochemistry and Biotechnology in Ein-Gedi. $^4$Faculty of Art and Sciences, Arab American University Jenin, Palestine.

**Abstract:** Psoriasis is a common cutaneous disorder characterized by inflammation and abnormal epidermal proliferation. Several observations indicate that cytokines produced within the skin are of major importance in the pathogenesis of psoriasis. Overexpression of proinflammatory, type 1 cytokines has been demonstrated in psoriasis and is believed to be of pathophysiological
IL-10 is a type 2 cytokine with major impact on immunoregulation, since it inhibits type 1 cytokine formation. The purpose of the present study is to investigate anti-psoriatic effects of extracts from Hypericum triquetrifolium (HT) and Peganum harmala (PH). These two plants are known in the local traditional medicine for their anti-psoriatic effects and exhibited in our preliminary studies cytostatic effects but not cytotoxic effects, and significantly reduced the LPS-induced nitric oxide production by monocytes/macrophages. In particular, we focus on their effects on the production levels of both proinflammatory cytokine (TNF-α and IL-6) and anti-inflammatory cytokine (IL-10). The aim of the present in vitro study is to evaluate the role of pro-inflammatory cytokines tumor necrosis factor-α (TNF-α) and interleukin 6 (IL-6) in the observed anti-inflammatory effects of HT and PH. Therefore, water extracts from the aerial parts of the two plants were tested for their anti-inflammatory effects in vitro using cells from the human monocyte cell line THP-1 co-cultured with keratinocytes cell line HaCat. Anti-inflammatory effects were assessed by measuring the levels of TNF-α and IL-6 production of LPS-activated THP-1 cells. Cells were treated with 5 g lipopolysaccharide/ml (LPS) in the absence and presence of increasing concentrations of plant extracts. During the entire experimental period, we used plant extract concentrations (up to 250 g/ml) that had no cytotoxicity as measured in MTT assay. HT extracts totally reduced the LPS induced TNF-α expression and secretion. Results obtained so far indicate that: 1. both plant extracts exhibit no sign of toxic effects at low concentrations (up to 250 g/ml). Reduction in cell viability was seen only after treatment with high concentrations of some plant extracts (higher than 500 g/ml). 2. Treatment with extracts of inhibited the LPS-induced NO production by cultured cells. Concentrations higher than 62 g/ml inhibited completely the NO production from cultured cells. 3. HT extracts totally reduced the LPS induced TNF-α production in co cultured cells. HT extracts had no significant effects on the LPS induced IL-6 nor IL-10. 4. HT was more effective in apoptosis induction compared to PH. These results demonstrate that the anti-inflammatory effects of HT and PH are mediated through the inhibition of the pro-inflammatory cytokines TNF-α and IL6 but not through the induction of the anti-inflammatory cytokine IL-10.

Key words: Hypericum triquetrifolium, Peganum harmala, psoriasis, cytokines.

1.55 Antibacterial Activity of Essential Oil of a Medicinal Plant Schinus molle
Mehani mouna and Ladjel segni
Laboratory of Process Engineering Univ. Kasdi Merbah Ouargla Road Gardaia 30 000. Algeria.

Abstract: Plants are capable of producing highly diverse natural substances. In effect, next to the primary metabolites, they accumulate metabolites called secondaries including essential oils that are used by humans in areas as diverse as a pharmacological or agrifood. The aromatic plant harvested in the month of May 2010 is among the most abundant species in the region South of Algeria. These Schinus molle: has been selected for screening antibacterial. Preliminary tests performed on the essential oil of Schinus molle showed that this oil has antibacterial activity vis-à-vis the bacterial strains (Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas, Proteus and Candida albicans). We used the dilution method on medium solidde to determine the minimum bactericidal concentration (MBC). The culture medium used was nutrient broth Muller Hinton. The interaction between the bacteria and the essential oil is expressed by a zone of inhibition with diameters of MBC indirectly expression of. Quantitative analysis of essential oils by hydrodistillation given the following yield: 1%. Our study reveals that the essential oil of the plant Schinus molle has a different effect on the resistance of germs for, Staphylococcus aureus, and Pseudomonas aeruginosa strains are moderately sensitive, also Klebsiella pneumoniae, Escherichia coli and Candida albicans represent high sensitivity. By against Proteus is a strain which represents a weak sensitivity. In this study, we performed the extraction of essential oils of the plant Schinus molle and their analysis on the five bacterial species Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas, Proteus and Candida albicans and on fungic species Candida albicans. The results indicated that essential oils of the plant Schinus molle showed an interesting biological activity.

Key words: Antibacterial activity, essential oil, Schinus molle, hydrodistillation.
1.56 Acute and Chronic Toxicity of Aqueous Extract of *Ruta montana* L. in Rodents

Merghem Mounira¹, Dahamna S¹, Rezzagui A¹, Boussahel S¹, Belguet A¹, Dehimi K. and Harzallah D.²

¹Laboratory of Phytotherapy Applied to Chronic Diseases, Department of Animal Biology and Physiology, Faculty of Natural and Life Sciences, University Ferhat Abbas. ²Laboratory of Applied Microbiology, Department of Microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbas, Sétif, 19000, Algeria.

Abstract: The objective of this study was to evaluate the acute and chronic toxicity of aqueous extract of *Ruta montana* L. in mice and rats. For the acute study, aqueous extract of *Ruta Montana* L. was administered to mice in single doses of 0-12 g/kg given by gavage. General behavior, adverse effects and mortality were determined for up to 14 days. In the chronic study, the extract was administered orally at doses of 0, 100, 300 and 600 mg/kg daily for 90 days to rats. Biochemical and hematological parameters were determined after 30 and 90 days. Enzyme activities were assayed in the plasma samples obtained. AST (GOT), ALT (GPT), Cholesterol, Triglyceride and Glucose. The results showed a decrease in RBC; WBC after one month (chronic dose) of treatment (in males 75.48% & 51.47% respectively), however an increase was unregistered after 3 months (in males 130% & 171% respectively). This probably explained by the effect of this plant extract on the erythropoiesis. A decline was observed on plasma enzyme activities in both GOT& GPT on males after one month by (51.67% & 68.6 % respectively). On the other hand, an increase after 3 months (acute dose) was recorded (on males 81.67% in females 184.61% respectively). These explain a high energy-generating product. A decrease was found in cholesterol and triglyceride by 95.55% & 78.36% in the plasma enzyme activity. In acute toxicity, there was no mortality and signs of toxicity. In Chronic toxicity, no mortality was observed, biochemical and hematological analysis showed no significant changes in any of the parameters examined of both sexes. Urine analysis was negative for glucose, bilirubin, ketones, blood, protein, nitrite and leukocytes in the control and treatment groups. There were no significant differences in the body and organ weights between controls and treated animals of both sexes. The histopathological studies have been carried out (results not shown).

Key words: Acute and chronic toxicity, aqueous extract, medicinal plants, *Ruta montana* L.

1.57 Studies of Antibacterial and Antioxidant Potential of Methanol Extract /Fractions of *Peganum harmala*

Meriem DJARMOUNI¹, Abderrahmane B¹, Naouel B., Hayet T¹, Sabah B², Farida B., Ameni D., Fatima Z. and Lekhmici A.¹

¹Department of Biochemistry Faculty of Biology, University Ferhat Abbas of Setif. ²Department of Biochemistry Faculty of Biology, University Brdj Bou-Arrêridj.

Abstract: *Peganum harmala* L. seeds (*Pgh*) were extracted with solvent of varying polarity allowed their separation into crude extract (CE), chloroform extract (CHE), ethyl acetate extract (EAE) and aqueous extract (AqE). The highest total polyphenols and flavonoids amounts were recorded in CHE (66.29 ± 1.57 mg EGA / g dry extract and 13.88 ± 0.13 mg EQ / g dry extract), followed by EAE (58.1 ± 1.57 mg EGA / g dry extract and 12.18 ± 0.08 mg EQ / g dry extract, respectively). The antioxidant activities of these extracts were estimated by superoxide scavenging ability and reducing power using (PMS-NADH-NBT) and FRAP assay. The result showed that CHE have the stronger superoxide scavenging effect with IC₅₀ of 0.395± 4.9117E-05 mg/ml, followed by EAE and CE with IC₅₀ of 1.644± 0.023 and 3.33± 0.047 mg/ml, respectively. The antibacterial effect of CE, CHE, EAE was assessed by the disc method. The results showed that this plant has a very important antibacterial effect on strains *E. coli* ATCC 25922, *S. aureus* ATCC 25923 and *P. aeruginosa* ATCC 27853. The most sensitive strain was *S. aureus* to both EAE and CHE with a
zone of inhibition of 35 and 26mm, respectively. These diameters are greater than those obtained by the antibiotics (between 23 and 33 mm). Strain E. coli ATCC 25922 was less inhibited compared to the previous strain and antibiotics, with diameters of inhibition ranging from 12 to 20 mm with all extracts. These results provided evidence that Peaganum harmala seeds had interesting antioxidant and antibacterial properties, which support its use traditional medicine.

Key words: Antibacterial, antioxidant, medicinal plant, Peaganum harmala, reducing power, superoxide.

1.58 Antibacterial and Anti-Adherence Effect of Pomegranate Peel on Oral Pathogens

Merzouk H¹, Azelmat J², Chibane M¹, and Chandad F.²

¹Laboratoire de technologie alimentaire, dép. SA, FSNV, Université A/Mira, Bejaia, Algérie.
²Laboratoire de contrôle microbiologique, GREB, Faculté de médecine dentaire, Université Laval, Canada.

Abstract: Studies on antimicrobial activity of pomegranate extract have been restricted to their antimicrobial properties on Streptococcal species while those of periodontal disease and biofilm formation are limited. The antibacterial activity of pomegranate peel was tested against eight oral bacteria. A peel of acid fruit was selected “QE”. Polyphenols were extracted with 50% (v/v). Bacterial strains and growth conditions: The microorganisms used in this study are P. Gingivalis (Pg), P. Intermediate (Pi), A. Actinomycetemcomitans (Aa), F. Nucleatum (Fn), S. Mutans (Sm), S. Sanguinis (Ssg), S. Gordonii (Sg), S. Oralis (So). The concentrations arranged between 500mg/ml to give the final concentration of 10mg/disc to 0.5mg/disc. The MIC of extract was determined by agar dilution method and inhibition of biofilm formation was evaluated by crystal violet staining assay. The results of the disc diffusion assay showed that the extract at 10mg/disc has an interesting antimicrobial activity against all bacteria tested. Pi (19.66mm) was the most sensitive bacteria. The MIC of extract ranged from 0.5-20mg/ml. The treatment showed also a significant biofilm inhibition in all the wells compared with controls. Extracts showed a significant inhibitory effect on biofilm formation by all the strains tested at certain concentrations. QE exert an effective inhibition 90% for Pg, at 250ug/ml and Sm 86% at 5mg/ml. Results of antibacterial activity showed that extract was effective on all tested bacteria. Antibacterial adhesion showed also reduction on biofilm attachment.

Key words: pomegranate peel extract, antibacterial activity, anti-adherence effect, oral strains.

1.59 Biological Activities of Plant Extracts on Skin Cells

Meybeck alain

AM Phyto-Conseil. 20ter rue de Bezons, 92400 Courbevoie. France.

Examples will be given of how testing extracts, fractions, or purified natural molecules on epidermal or dermal cells in culture can give information on their potential as new cosmetic active raw materials to meet the demand of the growing global market for products which improve skin condition or protect it from ageing.

Seabuckthorn or Hippophae rhamnoides Winter Twigs Extracts Could Lighten Skin Pigmentation

Abstract: It has been found that Hippophae rhamnoides winter twigs extracts have the highly valuable property to inhibit pigment formation in skin cells, whereas an extract of twigs collected in summer and bearing leaves had practically no effect. Different extracts and fractions were submitted to special tests on cultures of melanocytes (epidermal pigment producing cells) which allow evaluating the amount of melanin pigment synthesized. These tests have shown that: Seabuckthorn winter twigs polar extracts inhibit the biosynthesis of melanin pigments by skin cells, whereas a seabuckthorn summer twig extract has practically no activity on melanogenesis, the active compounds responsible for the whitening effect of Hippophae rhamnoides winter twig extracts are water soluble molecules, and these active molecules seem to be indole derivatives.
Ergosterol Found in Mushrooms and Yeast is An Anti-Senescence Compound Useful for Cosmetics

Abstract: Cells which have lost irreversibly their ability to divide while remaining viable are called senescent. They have first been observed in cell cultures after a number of replications, then in cultures after stresses, and finally in vivo in animals and man. The role they play in ageing is thought to be important, not only because cells which do not replicate themselves cannot very well participate in tissue renewal, but also because senescent cells secrete proteolytic enzymes such as MMP3, pro inflammatory cytokines such as IL-1, 6 and 8, or growth factors such as VEGF, which exert negative effects on their environment. It seems thus interesting to prevent the appearance of senescent cells. UVB stress induced premature senescence (SIPS) tests have allowed to show that pre-treatments with Vitamin D as well as its precursors 7-dehydrocholesterol and ergosterol can prevent the appearance of senescent cells characterized by the expression of the enzyme SA β-gal (senescence associated beta-galactosidase). In silico docking studies with the Vitamin D receptor (VDR) have shown that the mechanism of action of these molecules probably implies their binding with its “alternative”, recently described, non-genotropic binding site. Moreover, as these molecules activate the protein p53, often called “guardian of the genome”, it is tempting to put forward the hypothesis that it is this p53 activation known to trigger repair of DNA damages which prevents the occurrence of senescence. Mushrooms such as Poria, Ganoderma, Cordyceps, Polyporus, or Agaricus all contain ergosterol, and special ergosterol rich fractions could be developed for anti-senescence skin care cosmetic products.

Extracts of the Polynesian Plant *Microsorum scolopendria* could be Used As New Anti-Aging Cosmetic Active Ingredients

Abstract: A study was undertaken in order to determine whether extracts of the Polynesian plant Metua Pua’a could have interesting activities on skin. Metua Pua’a is the local name of *Microsorum scolopendria*, a fern which is a very popular medicinal plant in Tahiti. A total extract of *Microsorum* s. was made by soxhlet treatment of dry leaves with methanol. This crude extract E was fractionated, first by partition with chloroform and water to eliminate lipophilic molecules, then by partition of the polar phase between water and butanol to obtain a butanol soluble phase which was further purified through a polyamide gel column into a fraction F enriched in ecdysteroids among which ecysterone and ecydysone. The total extract of *Microsorum* s. (but not the ecdysteroid fraction F) up-regulates Heme Oxygenase 1, an enzyme which protects cells from oxidative stress (through the liberation of biliverdin, itself quickly converted into the antioxidant bilirubin) and which exerts several other activities like the photoimmunoprotection of skin by UVA through the liberation of carbon monoxide CO. The ecdysteroid fraction of *Microsorum* s. (rich in ecydysone and ecysterone) completely protects BJ dermal fibroblasts from stress induced premature senescence, thus confirming the results previously obtained with ecysterone from *Cyanotis arachnoidea*. It seems therefore that extracts or fractions of extracts of *Microsorum scolopendria* could protect skin against oxidative stresses and that they could be used to formulate better anti-aging cosmetic products.

Key words: Anti-Aging, anti-Senescence, biological activities, cosmetics, ergosterol, *Hippophae rhamnoides*, ingredients, *Microsorum scolopendria*, mushroom, plant extracts, skin cells.

1.60 Antimicrobial Activity of Pseudomonas Secondary Metabolites

**Mezaache-Aichour Samia, Guechi Abdelhadi and Zerroug Mohamed**

*Laboratory of Applied Microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbas of Sétif, ALGERIA.*

Abstract: Phenazines are nitrogen-containing heterocyclic molecules produced by fluorescent *Pseudomonas*. These compounds have broad-spectrum antibiotic properties including antimicrobial activity against phytopathogenic fungi and pathogenic bacteria. Several mechanisms of action have been proposed, including inhibition of DNA replication, uncoupling of electron transport and energy production, and disruption of normal membrane functions resulting in the generation of toxic intracellular oxygen species. Production of antimicrobial metabolites in *vitro* was assayed in NBY supplemented with glucose to a final concentration of 2%. Extracts of
supernatants from liquid cultures of the isolate completely inhibited phytopathogenic fungi when incorporated into agar culture at a rate equivalent to 0.31 – 0.94 ml culture filtrate/ml, this crude extracts was active against all tested fungi. In a disc assay, extracts equivalent to 0.31 ml supernatant gave zones of inhibition of 15 mm and 25 mm for the Gram positive bacteria *Bacillus subtilis* and *Paracoccus paratrophus*, respectively with disc diffusion technique. The purified extracts were analyzed by Infra red mass spectroscopy and GC/MS.

**Key words:** Antimicrobial, pseudomonas, secondary metabolites.

### 1.61 In Vitro Antimicrobial Activity of Extract from Seaweed, *Ulva rigida*, Protects HeLa cells from Hydrogen Peroxide Cytotoxicity

**Mezghani Sana, Bourguiba Ines and Amri Mohamed.**

*Laboratory of Functional Neurophysiology and Pathology, Research Unit, 00/UR/08-01, University of science, El Manar Tunis, Tunisia.*

**Abstract:** Over the past decades, seaweeds have aroused a special interest as potential sources of natural antioxidants and nowadays different compounds of marine algae are believed to exhibit potent antioxidant activity. In these regards, we have demonstrated in the present study that *Ulva rigida* contains a high content of total phenolic and flavonoids. Furthermore, DPPH antioxidant assays show clearly a huge antioxidant activity about 99% and 70% for water and methanol ulva extracts, respectively. Besides, exposure of HeLa cells to hydrogen peroxide (H$_2$O$_2$; 1mM, 3h) led to dramatic morphological changes including a condensation of the cytoplasmic content, cell shrinkage and a leakage of the cytoplasmic content implying an induction of a cell death process. However, the co-incubation of cells with H$_2$O$_2$ and crude extract of *U. rigida* prevents morphological cytotoxic effects. Cell viability assays reveal that the percent of viable cells co-treated with H$_2$O$_2$ and crude extract was higher than that obtained with cells treated with H$_2$O$_2$, only (65 versus 22%, $P<0.001$). Measurement of Lactate dehydrogenase (LDH), a stable cytosolic enzyme, from necrotic cells indicate that cells co-exposed to H$_2$O$_2$ and crude extract provoke a marked decrease in the release of LDH, when compared with cells treated with H$_2$O$_2$ only (62,5 versus 149,6%; $P<0.001$). Taken together, this study provides an evidence that *U. rigida* displayed a strong antioxidant activity and it protects HeLa cells from death trigged by an oxidative stress.

**Key words:** Antioxidant, extract, hydrogen peroxide, seaweed, *Ulva rigida*.

### 1.62 Clonal Propagation, Conservation and Antimicrobial Activity of *Achillea millefolium* and *Ruta graveolens*: A Medicinal Plant

**Mohamad Shatnawi**

*Al-Balqa Applied University, Biotechnology Department, Faculty of Agricultural Technology, Al-Salt 9117, Jordan.*

**Abstract:** Medicinal plant is grown in the wild of Jordan. Medicinal plant is used in traditional medicine for treating many diseases. Global and national markets for medicinal herbs have been growing rapidly, and significant economic gains are being realized. On the other hand, medicinal plants is getting endangered at an alarming rate because of ruinous and over-harvesting for pharmaceutical and food industry, with little or no regard to the future. Therefore, the aims of this project were to develop protocols for clonal propagation, medium term conservation, and to study the antimicrobial activity of *in vitro* and *ex vitro* grown plants. As an alternative to seed propagation, an efficient micropropagation of *Achillea millefolium* and *Ruta graveolens* and subsequent rooting were developed as an option for *in vitro* conversation purpose. The addition of Thidiazuron (TDZ) increased multiplication rate for both plants. Micorshoots were rooted on MS medium containing indole-3-butyric acid (IBA), indole acetic acid (IAA) or naphthalene acetic acid (NAA). A total of 90% survival was achieved when rooted explants were acclimatized *ex vitro* using 1 soil: 1 perlite: 1 peat mixture. Microshoots of *A. millefolium* and *R. graveolens* were successfully stored without serious losses by using MS medium supplemented with different concentrations of sucrose, glucose, fructose or sorbitol at 6 ± 2 °C or at 24 ± 2 °C for up to 16 weeks. *In vitro* and *ex vitro* leaf extracts of *A. millefolium* and *R. graveolens* were screened for
potential antimicrobial activity against some microbes such as *Escherichia coli*, *Staphylococcus aureus* and *Candida albicans*. Ethanolic and methanolic extracts exhibited a concentration dependent antibacterial and antifungal inhibition. Both *in vitro* and *in vivo* leaf extract showed similar antimicrobial activity. These results suggest that *A. millefolium* and *R. graveolens* is a promising antimicrobial agent.

**Key words:** Achillea *millefolium*, antimicrobial activity, clonal propagation, conservation, *Ruta graveolens*

1.63 Antioxidant activity of phenolic extracts from some local pumpkin seeds (*Cucurbita pepo*)

Mohamed BENALAI, Amar DJERIDANE, Zohra MOUSSA, Hadda GUETTAF and Mohamed YOUSFI

Laboratoire des sciences fondamentales, Université Amar Telidji. PB 37 G, 03000, Laghouat-Algérie.

Abstract: Among vegetables used by most local people are cucurbitaceae. However, pumpkin seeds and their oils are the subject of several studies in the health field. In recent years a special emphasis has been given to a specific class of phytochemicals antioxidant, the polyphenols. However, there is little information available on the antioxidant effects of Algerian legume plants. In the present work, we are interested to evaluate the antioxidant activity of phenolic extracts prepared by two solvent systems (methanol / water and acetone / water) of eight samples of local pumpkin seeds (*Cucurbita pepo*). The total phenolic content, analyzed using Folins-Ciocalteu's reagent, of the samples varied from 19.8 mg to 46.39 mg/100g dry weight, expressed as gallic acid equivalents (GAE). The evaluation of the DPPH radical scavenging power shows clearly that all the tested extracts have a remarkable antiradical effect. The extracts of samples 5 and 8 have proved the most active, with EC50 lower than 0.19 mg/ml. Moreover, the reducing capacity of molybdenum hexavalent ions of our phenolic extracts showed that the extract of sample 3 has a significant reducing activity compared to that of BHT (3.60 mg / ml). According to the obtained results, we can conclude that the local *Cucurbita pepo* seeds have considerable antioxidant activities which are mainly detected in extracts 3, 5 and 8. At the end of this study, the important antioxidant potential found in phenolic extracts of local pumpkin seeds would be appropriate for food and industrial applications.

**Key words:** Antioxidant activity, polyphenols, pumpkin seeds, reducing power.

1.64 The Antimicrobial Activity of Aqueous Extract and Essential Oil of *Stachys Rupestris* Montbret Et Aucher Ex Bentha

Erdoğan Elif and Everest Ayşe

Mersin University Faculty of Science and Letters, Biology Department, Mersin, Turkey.

Abstract: *Stachys rupestris* is an endemic specie which lives on ruins and stones at 50-1100 meters in Mersin and to our knowledge it’s antimicrobial activity has never been researched before. The aqueous extract and essential oil of the aerial parts of *Stachys rupestris* were investigated for its antimicrobial activity against four Gram positive-bacteria, three Gram-negative and two fungi species. Essential oil (EO) of *Stachys rupestris* extracted by hidrodistillation was analyzed by gas chromatography mass spectrometry (GCMS). The main components of EO of *Stachys rupestris* were 4-Aminostyrene (35.81%), 1S-alfa-pinene (6.98%), Caryophyllene (4.25 %), Bicyclo [3.1.1] hept-2-ene,2,6-dime (4.67 %). The antimicrobial effects of essential oil and aqueous extract were assessed on several pathogens, namely *Escherichia coli*, *Enterococcus feacalis*, *Bacillus subtilis*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, Klebsiella pneumoniae, *Candida neoformans*, *Candida parapsilosis*. This study indicated that the aqueous extract of the *Stachys rupestris* had lower antimicrobial effect than its essential oil. Anyway, it was found that the essential oil showed antimicrobial activity, particularly against fungi species.

**Key words:** antimicrobial, aqueous extract, essential oil, fungi, *Stachys rupestris*.
1.65 The Pyretic and Antiinflammatory Activity of the Leaves Extracts of *Thymus fontanesii boiss* and *Reut* from Algeria

**Mostefa sari F.**, **Mokabli A**, **Benmokadem N**, **Nemri M**, and **Chérif H-S**

*Institute of the nature and the ground sciences, Department of biology, University of Khemis Miliana.*

Abstract: The *fontanesii* Thymus Boiss and Reut is a very used plant in traditional medicine for its therapeutic virtues. The pyretic activity was estimated by the in vivo test of pyrogènes and completed by the in vitro test of the research for the bacterial endotoxines (LAL test). The antiinflammatory activity as for it, was estimated by injecting phlogogènes products in rats treated by the plant extracts. According to the results, both extracts of the plant provoked rises of the temperature, and there is no correlation between the dose and the pyretic effect (AEE1, AEE2, AE1, AE2, EOE, EO). However, we notice that there is a proportionality between the dose and the antiinflammatory effect as well for the essential oil as the aqueous extract, maximum of the effects were reached with the concentrations of essential oil of 0.44 % (ISP) and 4.4 % (Oral route) and those of the aqueous extract of 0.22 g / ml (Oral route).

Key words: Anti-inflammatory, aqueous extracts, essential oil, pyrogène, *Thymus fontanesii Boiss*.

1.66 Antimicrobial Activity and Chemical Composition of *Ocimum basilicum* L. Essential Oil from Algeria

**Moussa Brada**, **Leila Hadj K.,** **Djilali A.,** **Jean Paul W.**, and **Georges L.**

Abstract: The constituents of essential oil isolated by hydrodistillation of the overground parts of *Ocimum basilicum* L. from Algeria were examined by gas chromatography (GC) and gas chromatography/mass spectrometry (GC-MS). 46 components were identified accounting for 99.6% of the oil. The major compounds were linalool (44.7%), linalyl acetate (14.0%), 1,8 cineole (6.7%), myrcene (5.6%) and α-terpineol (5.1%). Furthermore, the oil was tested for antimicrobial activity against *Salmonella typhi* and *Escherichia coli*. The bacterial strains tested were found to be sensitive to essential oil studied and showed a very effective bactericidal activity. This work fits into the broader context of development of the biodiversity of herbs for their Algerian medicinal properties as dietary ones.

Key words: Antimicrobial activity, essential oil composition, linalool, linalyl acetate *Ocimum basilicum*.

1.67 Chemical Composition and Antioxidant Activity of *Saccocalyx satureioides* Essential Oil

**N. Gourine**, **K. H. Benabed**, **M. Ouinten**, and **M. Yousfi**

Abstract: This work aims to study the chemical composition and the antioxidant activities of the essential oils of a local medicinal plant *Saccocalyx satureioides*. The essential oils obtained by hydrodistillation of the aerial part of theses plants yielded 3.3% (w/w). The chromatographic analyses (GC and GC/SM) revealed that carvacrol is the main component for S. satureioides (51.82%). Other compounds were present in high contents: γ-terpinene (18.96%) and α-cymene
The antioxidant activity of the essential oils was determined employing two different assays: DPPH• free radical scavenging assay and Phosphomolybdenum assay. The results showed that the essential oils have an excellent reducing activity but low anti-radical power, by comparison with those of the antioxidants of reference. These results show clearly that the essential oil extract is a good antioxidant, and represent an important potential as a natural antioxidant.

Key words: Antioxidant, chemical composition, DPPH assay, essential oil, Saccocalyx satureioides.

1.68 In Vitro Vasomotor Effects of Capparis spinosa Aqueous Extracts

Nadia BENZIDANE¹, Imane K¹., Abderrahmane B¹., Noureddine C¹., Seddik K²., N. XAVIER³, and Lekhmici A.¹

¹Laboratory of Applied Biochemistry, Department of Biochemistry, Faculty of Nature and Life Science, University Ferhat Abbas, Setif, Algeria. ²INSERM U698, Faculté de Médecine Xavier Bichat, Paris, France.

Abstract: Capparis spinosa (Capparidaceae) dicotyledons from the class of spermaphytes, is an arbustive, enduring and woody plant, typically Mediterranean, largely used in folk medicine in the Mediterranean countries including Algeria. The aim of the present research is to assess the in vitro vasomotor effects of aqueous extract of different parts of Capparis spinosa (roots, leaves, stems, flowers, fruits and kernels). Rings of thoracic aorta and windpipe of rat Wistar were isolated streamlined cut and suspended by means of bath of organs containing 10 ml of Krebs physiological solution. The addition of Capparis spinosa extracts with different concentrations during the stage of contraction led by the phenylephrin for the thoracic arteries and acetylcholine for windpipes showed a light vasodilatation. Another protocol, by incubation 30 mn with extracts at different concentrations proves to be so efficient. Several doses (0,1 mg/ml, 1 mg/ml et 10 mg/ml) have been used. The dose of 10 mg/ml showed a significant vasodilator effect for fruits and kernels, and vasoconstrictor effect for leaves. This study is preliminary and cannot give an idea neither of the mode of action, nor of substance (s) responsible of the expressed effects.

Key words: Aortic ring, aqueous extract, Capparis spinosa, medicinal Plants, vasomotor effect.

1.69 Inhibition of Stromelysine-1 By Chicoric Acid Derivatives Isolated from Algerian Propolis.

Narimane Seguen¹,³, Abdulmagid Alabdul Magid², Martine Decarme¹, Salah Rhouati³, and Mesbah Lahouel⁴

¹Frank Antonicelli¹, Catherine Lavaud², William Hornebeck¹ ¹Unité Medyc, Université de Reims Champagne Ardenne, UMR 6237 CNRS, IFR 53 Biomolécules, UFR de Médecine, 51 rue Cognacq Jay, 51095 Reims.cedex, France. ²Laboratoire de Pharmacognosie, Université de Reims Champagne Ardenne, Institut de Chimie Moléculaire de Reims, UMR 6229 CNRS, IFR 53 Biomolécules, Bâtiment 18, BP 1039, 51687 Reims cedex 2, France;³Laboratoire des produits naturels d’origine végétale et de synthèse organique, Université Mentouri, Département de Chimie, Constantine 25000, Algérie. ⁴Laboratoire de phytopharmacologie, Université de Jijel, Département de biologie, Jijel 18000, Algérie.

Abstract: Repeated exposure of human skin to sunlight is considered as a major factor in the premature aging of skin (photoaging). The UV-irradiation caused excessive generation of ROS thereby resulting in an oxidative stress condition. It is suspected that ROS are capable of enhancing matrix metalloproteinase activity. Thus the approaches contracting ROS production may be useful for the prevention of photoaging and skin cancer. Polyphenols are known as potent antioxidants. In addition, they can decrease the level of MMPs production and increase the level of procollagen synthesis. In this study, our focus was on the effect of propolis polyphenols on stromelysin-1 (MMP-3), this enzyme occupies a central position in collagennolytic and elastolytic cascades. We screened extracts of a propolis sample with the aim to isolate compounds able to selectively inhibit this enzyme. A butanolic extract (B3) of the investigated propolis sample was
found to potently inhibit MMP-3 activity (IC50 = 0.15 ±0.03 μg/mL), with no or only weak activity on other MMPs. This fraction also inhibited plasmin amidolytic activity (IC50 = 0.05 μg/mL) and impeded plasmin-mediated proMMP-3 activation. B3 was fractionated by HPLC, and one compound, characterized by NMR and mass spectroscopy and not previously identified in propolis, i.e., (+)-chicoric acid, displayed potent in vitro MMP-3 inhibitory activity (IC50 = 6.3 × 10⁻⁷ M). In addition, both caffeic acid and (+)-chicoric acid methyl ester present in fraction B3 significantly inhibited UVA-mediated MMP-3 up regulation by fibroblasts.

Key words: Caffeic acid, chicoric acid, MMP-3, polyphenols, propolis.

1.70 Antibiogramm of Peonia mascula (L.)Mill

Nouioua W. Kaabeche M., Sersoub dj., Sebihi H., and Bouabedallah M
University Ferhat Abbas Sétif 19000 Algeria.

Abstract: Algeria has a very significant floristic richness. Many species are badly known, on the taxonomic and phytochemical level. So, this work was undertaken to study Algerian endemic species which is Peonia mascula (L.) Mill belonging to Paeonaceae family. The peony is distributed only in the north east of Algeria. The purpose of this study was to extract the essentials oils from the underground part of Peonia mascula by hydrodistillation and to evaluate its antibacterial activity. The essentials oils of this plant showed strong antibacterial activity against many strains of bacteria (E.coli.).

Key words: Antimicrobial, essentials oils, floristic, Peonia mascula (L.) Mill, paeoniaceae, phytochemistry.

1.71 Phenolic Compounds Analysis of Pulicaria incisa Foliage and their Antimicrobial and Analgesic Activities

OUAFI S., and SAHAR D.
Research Laboratory of Arid Lands, (LRZA) Faculty of biology, USTHB. BPN ° 32 El-Alia, Bab Ezzouar, 16111, Algiers.

Abstract: The flora of Algeria is very rich and diverse knowing that many medicinal plants are used in traditional medicine. Among these plants, the Pulicaria incisa belongs to the Asteraceae family, it extends in the Saharan regions and occupies the Tassili of Algeria (Tamanrasset and Adrar). Annual plant or occasionally perennial with many leaves and yellow flowers. It varies in size between 40 and 60 cm. The odor that emanates from the plant is very nice. The Pulicaria incisa is used as antibacterial, rich in phenolic compounds responsible for its therapeutic properties. In our work we were interested in separation, purification and identification of polyphenols (Flavonoids and phenolic acids) contained in the foliage in the first time. The study of the antimicrobial and analgesic activities of these compounds in a second time. Several chromatographic methods were used for the analysis of our extracts. The thin layer chromatography, high performance liquid chromatography, and UV-Visible spectrophotometry. We performed microbiological tests on gram-positive and Gram-negative bacteria, on fungi and yeasts. The evaluation of analgesic activity occurs by injection of acetic acid intraperitoneally in mice that causes a painful reaction manifested by cramping, which can be reduced by an analgesic product. This study compares the reduction in the number of cramps after administration doses of test and reference product (Aspirin). Among the principal compounds we have identified: two flavons (tricin, apigenin) and two flavonols (quercetin, rhamnetin) caffeic acid and cyanidin as anthocyanin. The research results of chemical diversity of the species considered showed that individuals of both arid regions (Tamanrasset and Adrar) are divided into two groups or clones which confirms the presence of two distinct chemotypes. The antibacterial and pharmacological tests showed that the medicinal plant
**pulicaria incisa** (L) DC has antibacterial activity with the fraction containing anthocyanin and glycosides, as well as analgesic activity using the hétérosidique fraction. The result justifies its use by the Tuareg people to treat headaches and to reduce fever.

**Keywords**: Analgesic activity, antibacterial, medicinal plants, phenolic compounds, sahara populations.

### 1.72 Antimicrobial Effect of Essential Oils of *Thymus algeriensis* and *lavandula stoechas*

**Oukil naima and Bedjou fatiha**

*Laboratoire de biotechnologie végétale et d’ethnobotanique faculté des sciences de la nature et de la vie, université de béjaia, Algérie.*

**Abstract**: Essential oils are known for their antibacterial and antifungal activities. This work has two objectives, the first, to evaluate the antimicrobial activity of two essential oils extracted by the method of hydrodistillation from two aromatics Algerian plants: *Thymus algeriensis* and *Lavandula stoechas*; and the second to identify the different components of these oils. Antimicrobial activity was evaluated by the agar diffusion method. 10³ bacteria /ml was applied to Muller Hinton plates using a cotton swab. After a few minutes to allow complete absorption of the inocula, discs impregnated with crude essential oil or its dilutions were placed onto the surface. Results obtained in this study showed that essential oils of *Thymus algeriensis* and *Lavandula stoechas* have strong antibacterial and antifungal activities, overcoat against Gram positive bacteria. Essential oils of *Thymus algeriensis* showed high activities against *Klebsiella pneumoniae* (25,43mm), *Bacillus subtilis* (30mm), *Staphylococcus aureus* (32mm), and *Listeria innocua* (32mm). *Lavandula stoechas* essential oil showed very high activities against *Staphylococcus aureus* (90mm) and *Bacillus subtilis* (90mm) and a high activity against *Listeria innocua* in (30mm). Antifungal activity showed that essential oil of *Thymus algeriensis* has a better activity (inhibition =100% in case of *Rhizopus* and *Candida*) than essential oil of *Lavandula stoechas*. Essential oils of *Thymus algeriensis* showed a fungicidal effect on *Candida albicans* and *Rhizopus sp* with a percentage of inhibition equal at 100%. The presence of phenols in these essential oils explains their antimicrobial effect. These results suggest that essential oils of *Thymus algeriensis* and *Lavandula stoechas* provide substantial antimicrobial activity. Flora of Algeria appears to be a rich and interesting source for the treatment of several pathologies.

**Key words**: Antimicrobial, essential oils, *lavandula stoechas*, *Thymus algeriensis*.

### 1.73 Effect of the Leaf Extract of *Afgekia mahidolae* on Wound Healing by Scratch Assay

**Petpiroon , Nareerat¹,² Pongsamart, S¹, and Sukrong, S.²,³**

¹Department of Biochemistry and Microbiology, Faculty of Pharmaceutical Sciences, Chulalongkorn University. ²Unit cell for research and development of herbs and natural products for dental application, Chulalongkorn University. ³Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand

**Abstract**: Wound healing is a complex process in wound repair of tissues injury which an important process including cell proliferation and migration. The aim of this study was to evaluate an effect of *Afgekia mahidolae* leaf extract on wound healing by using scratch assay, normal human skin fibroblasts (CRL-2076) and keratinocytes (HaCaT) were applied. Leaves of *A. mahidolae* B.L. Burtt & Chermsir. were extracted with methanol. Cytotoxic effect of the extract was examined by MTT assay. The results showed that the extract up to 1 mg/ml did not show cytotoxic effect on human skin fibroblast. However, 1 mg/ml of the extract reduced cell viability of keratinocytes to 18 %. The extract at concentration ranges of 0.001-100 µg/ml did not exhibit cell proliferation in both cells. The scratch assay showed that the extract at 0.001-1 µg/ml significantly
accelerated 90 % wound closure at 24 hours on keratinocytes faster than control. While, the extract at 1 µg/ml showed potentially accelerate wound closure on skin fibroblasts, but the percent wound closure was not significantly different from control. Furthermore, the extract promoted migration of keratinocytes better than fibroblasts. These results suggested that the acceleration of wound closure of extract on cell keratinocytes involved the cell migration process. The extract has a potential to be applied for healing skin wounds.

Key words: Afgekia mahidolae, leaf extract, scratch assay.

1.74 Antioxidant Activity of Vaccinium corymbosum L. and Ribes nigrum L. Extracts

Poracova, Janka¹ Tkacikova, Ludmila², Šedlak, Vincent³, and Blascakova, Marta¹

¹Department of Biology, Excellence Center of Human and Animal Ecology, Presov University. ²Institute of Immunology, University of Veterinary Medicine and Pharmacy in Kosice. ³Department of Ecology, Presov University in Presov, Faculty of Humanities and Natural Sciences.

Abstract: Many in vitro and in vivo studies have shown that plant polyphenols, including anthocyanins have various beneficial biological properties which may play an important role in protecting of human and animal health. Anthocyanins have antioxidants effects and inhibit lipid peroxidation. Therefore, a major anthocyanins have antiinflammatory, anticancerogenic and some of them antimicrobial activity. Antioxidant properties of extracts and juices of highbush blueberry, (Vaccinium corymbosum L.) and, black currant (Ribes nigrum L.) were analysed by the method DPPH⁺. The samples were diluted by methanol before the measurement of antioxidant activity. The antioxidant activity was determined by method Šeršeň and Grančai (2008). Concentrated extracts as well as diluted samples were stored at -20°C. The values of absorbance were measured at individual diluted of sample. The dynamic antioxidant capacity in individual samples was followed on basis obtained values of absorbance and antiradical capacity. The value of SC₅₀ was calculated on the basis of observed values. The samples were measured spectrophotometrically at 515 nm by the UV – 1800, spectrophotometer (SHIMADZU, Japan). SC₅₀ was 39,31 in juice of highbush blueberries in the retail network, commercially prepared; SC₅₀ = 27,24 was in concentrated extract of ethanol, SC₅₀ = 205, 67 was in juice obtained naturally without any chemical additives, SC₅₀ = 255, 50 water extract CW071, SC₅₀ = 251, 56 water extract highbush blueberries. SC₅₀ in extract and juice of black currants were following: SC₅₀ = 30, 63 concentrated extract of ethanol, SC₅₀ = 97,89 natural juice, SC₅₀ = 284,53 water extract of black currant. High levels of SC₅₀ were found in natural juice of highbush blueberry (Vaccinium corymbosum L.) and black currant (Ribes nigrum L.), which suggest their high natural antioxidant activity. Found properties of studied extracts indicate that these berries can be used as natural additives for human and animal health.

Aknowledgements: This work was supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, project identification number – Stimuly 00162-0001 (SR-3634/2010-11 ME) and by th Agency for Structural Found EU, the code project: ITMS 26220120041

Key words: Antioxidant activity extracts, plant polyphenols, Ribes nigrum, Vaccinium corymbosum.
1.75 The Effect of Aloe Vera Leaf Gel in Promoting Wound Healing and As an Antibacterial Agent

Qaragholi, Zena M.F., and AlKayyat, Ali
College of Pharmacy/ Dep.of Pharmacognosy and Medicinal Plants, Cultural Affaira, University of Baghdad, Iraq.

Abstract: This study explored the effect of crude Aloe Vera leaf gel in promoting wound healing and to investigate its antibacterial effect against some pathogenic bacteria in comparison with standard antimicrobial agents as Gentamycin and also other medicinal plants as Nigella Sativa oil. Culture medias as BHIB (Re-isolation of the test bacteria), Nutrient Agar (Sensitivity test), Nutrient broth (MIC& MBC), Gelatin Agar (Biochemical method), MacConkey agar (Diag. Pseudo.A), Mannitol Salt agar (Diag of Staph. Aerreus) and Milk agar (Biochemical Method). Chemicals and reagents as H2O240% (Catalase test), Tetramethyl-p-Phynelene Diamine Dihydrochloride1% (Oxidase test), Crystal Violate, Iodine solution, acetone, Safranin (Gram Stain), Normal saline, Boues Sol. And Gentamycin. Standard dilutions of Aloe Vera leaf gel were made from 10-100%, its antibacterial effect had been examined by seeded agar method against Staphylococcus aureus and Pseudomonas aeruginosa Gentamycin and Nigella Sativa oil were used for comparison. To explore the effect of Aloe Vera in vivo, twenty four local male rabbits were used and divided into 4 equal groups. Each animal was wounded in both sides of the back region. The first group was control, designed to observe normal wound healing. The second group was treated with crude Aloe Vera gel twice daily for 10 days. While the third group was wounded and infected with Staphylococcus aureus without treatment to observe the natural body defense. The last group was infected with the same bacteria and treated with crude Aloe Vera. Left side wounds in all groups were left as self-control. Statistical analysis showed a significant difference (P<0.05) in comparison with Nigella Sativa oil. The Effect of Aloe Vera gel against Staphylococcus aureus was more potent than against Pseudomonas aeruginosa. The Minimum Inhibitory Concentration (MIC) was 60mg/ml and the Minimum Bactericidal Concentration (MBC) was eighty mg/ml. A significant decrease in wound diameter was noticed in the groups treated with Aloe Vera gel in comparison with the non-treated control group. It can be concluded that this study is a good step to show that crude Aloe Vera leaf gel promotes wound healing and has an antibacterial effect in vitro and vivo against Staphylococcus aureus and Pseudomonas aeruginosa.

Key words: Aloe vera leaf, bactericidal, healing, Pseudomonas aeruginosa.

1.76 Studies on Antimicrobial, Phytochemical and In Vitro Micropropagation of Ludwigia perennis L.

R. Jeyachandran
Head, Department of Botany, St. Joseph’s College (Autonomous), Tiruchirapalli- 2

Abstract: Clinical microbiologists and plant pathologist have great interest in screening of medicinal plants for antimicrobial activities and phytochemicals as potential new therapeutics. Hence an attempt was made to assess the antimicrobial activity, in vitro micro propagation for conservation and phytochemical analysis for identification of bioactive principle of Ludwigia perennis L., which is recommended as an antibacterial and diuretic agent in case of fever, cystitis, and hemorrhagic dysentery in indigenous medicinal systems. Fresh plant parts are used for treating snake bite and diseases of scalp. Among the explants tried, nodal explants performed better and the number of shoots induced was medium and it was recorded as 15 on MS medium supplemented with BAP (1.6 mg/l) and NAA (0.4 mg/l). Ethanol, acetone, and methanolic whole plant extract of Ludwigia perennis exhibited very good antibacterial activity against Vibrio cholera, Salmonella typhi and Bacillus subtilis. A phytochemical study reveals the presence of varied secondary metabolites such as carbohydrates, glycosides and phenols.

Key words: Antimicrobial, Ludwigia perenni, micropropagation, phytochemical.
1.77 New Strategies in the Search for Natural Products with Anti-Inflammatory Activity

Rudolf Bauer
Institute of Pharmaceutical Sciences, Karl-Franzens-University Graz, Austria.

Abstract: Natural products possess a great structural diversity which is not commonly seen in synthetic molecules. Therefore, they continuously play a predominant role in the discovery of new drug leads. PPARγ is one of the three Peroxisome Proliferator Activated Receptor (PPAR) subtypes and is involved in the regulation of glucose and lipid metabolism and therefore an important target for metabolic diseases. Additionally, PPARγ plays a role in other chronic diseases such as inflammation, cancer and atherosclerosis. Within a national research network we have investigated Chinese medicinal plants for new anti-inflammatory compounds including PPARγ agonists, using an in-silico and activity guided approach. From the roots and rhizomes of Notopterygium incisium Ting ex H. T. Chang (Qiang Huo) we have isolated several polyacetylene and frulic acid derived compounds with anti-inflammatory activity. They showed inhibitory activity on NO production in RAW 264.7 macrophages, inhibitory effects on leukotriene and prostaglandine formation, and PPARγ agonistic effects. Therefore they are good candidates for further drug development.

Acknowledgements: We gratefully acknowledge the funding provided by the Austrian Science Fund (FWF) within project NFN S 10705-B13.

Key words: Anti-inflammatory activity, Natural Products, new strategies.

1.78 Antimicrobial activity of Carthamus sp a Medicinal Plant in Algeria

Saffidine Karima¹, Sahli Farida² and Zerroug Mohamed Mihoub²

¹Department of Medicine, Faculty of Medicine, University Ferhat Abbas of Sétif, ALGERIA.
²Department of Microbiology, Faculty of Natural and Live Sciences, University Ferhat Abbas of Sétif, ALGERIA.

Abstract: Medicinal plants constitute a source of bioactive substances to treat chronic as well as infectious diseases in many countries of the world. A wide range of active compounds used as natural antimicrobial agents are economically accessible to face the apparition of phenomena of germ resistance to antibiotics. Carthamus includes almost all plants of the family Asteraceae growing in the Mediterranean area. This botanical genus has been traditionally used to treat various diseases: cardiovascular diseases, male sterility and skin diseases. It is either known to possess sedative and anti-tumor activity. Our work was undertaken in order to evaluate the antimicrobial activity of a species of Carthamus growing in Sétif area in the North-East of Algeria. The study was carried on the roots and leaves of this plant. The antimicrobial activity of aqueous and organic plant extracts was evaluated in vitro against ten bacterial and four fungal strains using disc diffusion method. It is also noteworthy that this study of the antimicrobial of this species is performed for the first time. The results showed a good activity of root and leave extracts in vitro against Gram-negative and Gram-positive bacteria strains as well as against pathogenic fungus. Organic fractions from methanol and ethanol extracts exhibited high inhibition zones against one or more of the tested microorganisms, compared to aqueous fractions with lowest activity. Maximum antifungal activity, 25 mm, was obtained against Candida albicans and moderate one, 10 to 12 mm, on plant pathogenic fungus: Aschochyta rabiei, Fusarium oxysporum albodinis and Fusarium Var coerileum. But for antibacterial activity, maximum of 20 mm was exhibited against Staphylococcus aureus, Bacillus cereus and Acinetobacter bowii. While, low activity was obtained against Enterobacter faecalis, 10 mm and Pseudomonas aeruginosa, 9 mm. Extracts of this species may contain effective compounds against pathogenic microorganisms. These agents are in investigations to define their chemical structure and characteristics.

Key words: Antimicrobial activity, Carthamus, plant extracts.
1.79 Antioxidant Activity of the Aqueous and Methanolic Extracts from Peganum harmala Seeds

Saliha Dahamna¹, Abir Rezzagui¹, Mounira Merghem¹, Dalila Bouamra¹, Daoud Harzalah², Assia Belguel¹, Soulef Boussahel¹, Karima Yaici¹, and Khadidja Dehimi¹

¹Laboratory of Phytotherapy Applied to Chronic Diseases, Department of Animal Biology and Physiology, Faculty of Natural and Life Sciences, University Ferhat Abbas, Setif. ²Laboratory of Applied Microbiology, Department of Microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbas, Sétif, 19000, Algeria.

Abstract: Peganum harmala L. (Zygophyllaceae), commonly known as “Harmel” in North Africa, is widely used in traditional remedies for the treatment of a variety of human ailments. The seeds of this plant are reported to possess antidepressant, antidiabetic, antimicrobial, anticancerous and hallucinogenic effect. In this work the antioxidant potential of the aqueous (AqE) and methanolic (MeE) extracts of Peganum harmala seeds was investigated, and the second was the DPPH radical scavenging activity. The analysis of the extracts showed that AqE contains the highest amount of polyphenols followed by MeE (158.25 ± 6.80mg EAG/g dry extract and 98.44 ± 3.58mg EAG/g dry extract, respectively) and the inverse in the flavonoids amounts with 7.68 ± 0.66mg EQ/g dry AqE and 10.15 ± 0.017mg EQ/g dry MeE. The β-carotene/linoleic acid bleaching assay revealed that the two extracts have an important antioxidant activity with 66.50 ± 1.46% of inhibition for AqE and 79.71 ± 0.34% for MeE. High DPPH radical scavenging was observed in MeE (0.194 ± 0.013mg/ml) followed by AqE (1.345 ± 0.036mg/ml). All together, these results showed an antioxidant potential in both AqE and MeE, and suggested that these natural extracts could be used to treat several diseases, especially, the stress oxidative-related disorders, through the free radical scavenging activity and/or the inhibition of lipid peroxidation.

Key words: Antioxidant activity, Free-radical scavenging activity, Peganum harmala L., DPPH.

1.80 Antioxidant and Anti-inflammatory Activities of Extracts Aqueous and Ethanol for Ginger.

SELLAL, A¹, SENATOR A², and Belattar R³

¹Laboratory of Biochemistry, Faculty of Natural Sciences and Life, Department of Biochemistry, University Ferhat Abbas Setif. ²Laboratory of Biochemistry, Faculty of Natural Sciences and Life, Department of Biochemistry, University Ferhat Abbas Setif. ³Department of Ecology and Plant Biology University of Constantine. Algeria

Abstract: In the present study, the activities of ethanolic and aqueous extracts from ginger rhizome were evaluated firstly in vivo using acetic acid induced vascular permeability and xylene induced ear edema by topical application in mice as a model of acute inflammation. The oral administration of this extracts at dose of 400mg/kg, one hour before the induction of inflammation, showed a high significant (p≤0.01) anti-inflammatory effect, compared to control group considered as 100% of inflammation. Secondly, the antioxidant effect of ethanolic extract was studied only in vitro (aqueous extract were studied in the priors works in our laboratory) using DPPH, total antioxidant activity, metal chelating and s-carotene/linoleic acid tests. Results obtained showed that this extract have a good scavenger effect towards DPPH radical and lipid peroxidation in total antioxidant activity and s-carotene/linoleic acid tests. In Contrast, this extract hasn’t metal chelating effect.

Key words: Inflammation, oxidation, free radicals, ginger.
1.81 Antioxidant Activity and Scavenging Effect of Oregano and Tea Aqueous Extracts.

Senator Abderrahmane, Belambri, S.A, Kaabour, F., and Bouriche, H.
Laboratory of Applied Biochemistry, University Ferhat Abbas, Setif, Algeria.

Abstract: Antioxidant activity and free radical-scavenging capacity of aqueous extracts obtained by decoction and infusion from oregano and tea leaves were determined by four different assays (DPPH radical scavenging activity, antioxidant activity with β-carotene/linoleic acid assay, total antioxidant activity and metal chelating activity). Leaves of oregano were collected from Setif region, whereas Chinese green tea (disma) was purchased from local supermarket (Setif, Algeria). Tea and oregano extracts were prepared from 10g of dried leaves steeped in 200 ml of boiled water or boiled in the same volume for 20 min, respectively. After filtration and centrifugation, the residue was lyophilized. Results indicated that the four extracts of oregano and tea exhibited significant and similar DPPH radical scavenging activity, but slowly lower than the activity of ascorbic acid used as standard antioxidant. This activity was concentration-dependent and became stable when it riches the maximum values of 86% and 88% for oregano and tea respectively. The four extracts also inhibited similarly and strongly lipid peroxidation; at the same concentration (130 µg/ml) similar inhibition was obtained with BHT, used as positive control. The absorbance of β-carotene solution remained stable in presence of each extract during all the incubation period (120 min). The total antioxidant activity was measured using ferric thiocyanate test which determines the amount of peroxides produced at the initial stage of lipid peroxidation. Lower absorbance indicates a higher level of antioxidant activity. The extend of inhibition of lipid oxidation is very important with all the samples tested, which is in agreement with results obtained in β-carotene/linoleic acid assay system. In fact, in the presence of both extracts of tea and oregano, absorbance remained very low during all the incubation time. After 96 h, inhibition of lipid peroxidation was about 88-90%. Moreover, both extracts of tea exhibited a considerable Fe2+-chelating activity (80% maximum), with IC50 of 1.73 mg/ml and 1.55 mg/ml respectively. However, oregano extracts showed a moderate chelating activity (65% maximum) with IC50 of 2.50 mg/ml and 2.80 mg/ml, respectively. Leave infusion or decoction extracts of oregano and tea can be used potentially as a readily accessible source of natural antioxidants principles and a possible pharmaceutical supplement.

Key words: Antioxidant, decoction, tea extract, infusion, oregano extract, scavenging.

1.82 Study of Tyrosinase Inhibitory Activity of Major Fractions of Quercus infectoria Galls

Sharififar, Fariba1, Purhemati, Amin2,3, Moshrefi, Mandana2,3, Raeiat, Zeinab1

1Traditional and Herbal Medicines research Center, Department of Pharmacognosy, Faculty of Pharmacy, Kerman University of Medical Sciences, Kerman, Iran. 2Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, Kerman, Iran. 3American Chemical Society, Washington, DC 20036, USA.

Abstract: Our previous studies have proven the high tyrosinase inhibitory effects of Quercus infectoria galls, an endemic plant to Iran. Considering the potency of tyrosinase inhibitors in cosmetic as a skin depigmentation and lightening agent, we have studied the galls of Quercus infectoria, and its major fractions for tyrosinase-inhibitory activity. Methanolic extract of Q. infectoria galls was evaporated in vaccum. The resulting residue was suspended in water and extracted successively with increasing orders of a combination of petroleum ether, chloroform, ethyl acetate and methanol in increasing order of polarity. As a result, fractions 1–18 were obtained. The fractions were initially screened for the O-diphenolase inhibitory activity of tyrosinase using L-tyrosine as substrate on TLC plate by bioautography method. All the active inhibitors from the first test were dissolved in methanol to give at least 5 concentrations. 80 microliter of L-tyrosine (0.5mM) was added to wells containing 50 microlitre sample, incubated for
4 minutes in room temperature. Thirty microlitres of mushroom tyrosinase (1000 units/ml) was added and incubated again for 10 min at 35°C. The enzyme reaction was monitored by measuring the change in absorbance at 475nm (at 37°C) for 10 min. The percent of inhibition of the enzyme was measured and IC\textsubscript{50} values of each sample were calculated by probit analysis. Antioxidant activities of the fractions was measured using the 1,2-diphenyl-2-picrylhydrazyl (DPPH) antioxidant assay. Amongst the separated fractions, fractions 5 and 7 separated in ethyl acetate-methanol exhibited the most inhibition of mushroom tyrosinase (% 89.2 and %93.65 inhibition respectively) in comparison to kojic acid (%96.54 inhibition). The least IC\textsubscript{50} values were due to fractions of 5 and 7 (IC\textsubscript{50} values of 80 and 120 µg/ml respectively). Total extract showed %86.34 inhibition with IC\textsubscript{50} value of 420 µg/ml (kojic acid with IC\textsubscript{50} = 27.6 µg/ml). The most antioxidant effect of \textit{Q. infectoria} fractions was due to fractions 5 and 7 with IC\textsubscript{50} values of 14.7 and 21.3 µg/ml respectively. These two potent fractions were positive to phenols tests. Our findings indicated the fractions with potent antityrosinase effect have shown also the most antioxidant effect. These fractions were extracted in ethyl acetate- methanol fraction, so might have semipolar nature like gallic acid and/or ellagic acid. The confirmation of this thesis needs more fractionation which is carrying out.

\textbf{Key words:} Antioxidant, fractionation, \textit{Quercus infectoria} galls, tyrosinase inhibition.

1.83 Morphological characteristic and antioxidant activity of silver birch (\textit{Betula verrucosa} Ehrh.) pollen

\textbf{Shevtsova Tetiana\textsuperscript{1}, Garkava Kateryna\textsuperscript{1}, Brindza Jan\textsuperscript{2},and Ostrovsky Radovan\textsuperscript{2}}

\textsuperscript{1}National Aviation University, Institute of Ecological Safety, Kiev, Ukraine. \textsuperscript{2}Institute of Biodiversity Conservation and Biosafety, Faculty of Agrobiology and Food Resources, Slovak University of Agriculture (SUA) in Nitra, Slovak Republic.

\textbf{Abstract:} In Ukraine, as well as in many other countries of the world, different parts of a birch are used in food, pharmacology and cosmetics for the health improvement and other purposes. Unfortunately, the birch pollen can initiate allergy as well. Therefore the aim of this study is to establish distinctions of morphological traits and antioxidant activity of silver birch pollen grains collected in different habitats on Ukraine territory and also to define the relevant relationships between them. For the comparative analysis 7 samples of the silver birch pollen have been prepared taking into account different location measures, background radiation and anthropogenic influence in Kiev and Rivne regions of Ukraine. The length of polar axis, equatorial diameter, apoporial field edge, shape index and other morphological traits were evaluated on scanning electron microscope using the software AxioVs40 V 4.8.2.0. Total antioxidant activity of water and ethanol extracts of birch pollen grains were defined in reaction with DPPH. Variability of the most important morphological traits of pollen – the length of the polar axis and equatorial diameter is respectively 17.90 µm (Pereiaslav-Khmelnitkysky (control)) – 18.97 µm (Ivankov) and 22.58 µm (Pereiaslav-Khmelnitkysky (control)) – 23.98 µm (Ivankov). Shape index ranged from 0.77 (Kuznetsovsk) to 0.81 (Pereiaslav-Khmelnitkysky). It was established that the pollen of silver birch is characterized by high antioxidant activity: values of the total antioxidant activity for the pollen water extracts are defined within 80.54% (Pereiaslav-Khmelnitkysky (control)) – 85.50% (Ivankov), for ethanol extracts 60.27% (Hotsky (control)) – 84.91% (Kuznetsovsk). Statistically significant differences between birch pollen samples collected in different habitats of Ukraine were found in all parameter. Results have confirmed that among the \textit{Betula verrucosa} Ehrh. populations there are significant distinctions in morphological traits and antioxidant activity of pollen grains and the dominance of the differences of the same samples in different researches.

\textbf{Key words:} silver birch; \textit{Betula verrucosa} Ehrh., syn. \textit{B. pendula} Roth.; pollen; morphology; total antioxidant activity.
1.84 Antioxidant and Anticancer Activities of Terminalia ferdinandiana (Kakadu Plum)

Sirdaarta J.P., and Cock I.E.
Environmental Futures Centre & Biomolecular and Physical Science, Griffith University, Brisbane, QLD.

Abstract: Kakadu Plum (Terminalia ferdinandiana Exell, Combretaceae) is an Australian native plant endemic to the tropical northern regions of Australia. It is known for its extremely high ascorbic acid and antioxidant content. Previous studies indicated that Kakadu plum may have medicinal potential in the treatment of various diseases. This study aimed to investigate its potential to quell free radicals and its role as an anticancer agent. Dehydrated Kakadu plum fruit were extracted with a variety of solvents and the extracts were dried and resuspended as aqueous solutions. The extracts were tested for their antioxidative potential in established assays. The extracts were also tested in vitro for anticancer activity by exposing a variety of cancer cells and normal cell lines to the extracts and noting cell viability and cell death. Kakadu Plum extracts exhibited substantial anti-oxidative activity, reducing power, superoxide anion scavenging potential, DPPH radical scavenging activity and ability to limit lipid peroxidation in antioxidant assays. Subsequent trials of Kakadu plum extracts against normal cell lines (Hs 738.St/Int, CCD-18Co ect.) and cancer cell lines (AGS, HT-29, HL-60 etc.) were attempted to confirm previous studies. Positive results were noted against all cancer cell lines, yet the normal cells were largely unaffected. The extracts were also tested against a wider panel of cancer cell lines, exhibiting anticancer activity against most cancer cell lines tested. Equally important, the Kakadu plum extracts did not inhibit the viability of any normal cell line tested. Kakadu plum extracts show promise in the treatment of a variety of different types of cancer, yet are non-toxic towards normal cell lines.

Key words: Australia, cancer cell, extracts, free radicals, Kakadu Plum.

1.85 Biological evaluation of Orchids of Kolli hills of Eastern Ghats’s, India

Senthilkumar Subburaman
Dept. of Botany, St. Joseph’s College (Autonomous), Tiruchirappalli-620002, INDIA

Abstract: The Kolli hills, a part of Eastern Ghats of India are a treasure of medicinal plants. An attempt is made to gather information about the traditional usage of orchids from the local healers. A diversity of orchid flora is being used to treat especially for UT infections. Different parts (leaf, Pulp and root) are collected in two seasons (summer and winter) of about 20 orchid species and their photochemical present in them are analysed. Leaf is found to be the potential source for most of the phytochemicals and used as study material for the various solvent extracts (methanol, ethanol, chloroform, acetone, ethyl acetate, benzene and hexane) is screened for both summer and winter samples. Of the 35 organisms studied viz. Staphylococcus aureus, Streptococcus foecalis, Bacillus cereus, Proteus vulgaris, Proteus mirabilis, Pseudomonas aeruginosa, Klebsiella pneumonia, Shigella dysenteriae, E.coli, Microsporum audouinii, Microsporum fulvum, Candida albicans and Trichophyton rubrum are found to be more sensitive against Acanthephippium bicolor leaf extracts. The gram negative bacteria are found to be more sensitive than negative bacteria and selected fungi. The inhibition is found to be more in methanol extract. The summer and winter samples were compared for their antimicrobial efficacy shows no significant difference. The results proves that there is no impact of season on antibacterial activity of the orchids studied and Acanthephippium bicolor would be the best herbal species could be used for UT infection can be used throughout the year as no seasonal impact. Our studies showed that ethnomedicinal orchid species used by the traditional healers are under serious threat due to several factors, which indicates the need for their conservation and sustainable utilization.

Key words: Biological evaluation, eastern ghats’s, kolli hills, orchids.
Hepatoprotective and Hypolipidemic Effects of Red Ginseng Crude Extract in Obese Rats.

Shalaby A. Mostafa and Hamouda A. Ashraf
Pharmacology Department, Faculty of Veterinary Medicine, Cairo University, Giza, P.O. Box 12211, Egypt.

Abstract: The effects of red ginseng extract (RGE) on liver function, serum lipids and some metabolic hormones were evaluated in obese rats. Sixty male rats were distributed into 6 equal groups, each of 10 animals. Group (1) was fed on basal diet (normal control), while the other five groups were fed on high fat-diet for 8 weeks to induce obesity. Group (2) was kept as an obese control, while groups (3), (4), (5) and (6) were orally given RGE at 50, 100, 150 and 200 mg/kg-1/day, respectively for 4 weeks. At the end of experiment, blood was collected from orbital plexuses of veins and used for separating serum for estimation of some serum biochemical constituents. Histological examination of the livers was also carried out. Results showed that RGE significantly decreased the elevated levels of AST, ALT and ALP enzymes; reduced levels of TC, TG and LDL. It increased serum levels of insulin and decreased leptin hormone in obese-treated rats. RGE at the large dose (200 mg/kg-1) ameliorated the degenerative changes seen in liver of obese rats. Red ginseng crude extract has hepatoprotective and hypolipidemic effects in obese rats. Therefore, this study recommends that daily intake of red ginseng roots as a drink may be useful for obese patients who suffer from liver diseases associated with hyperlipidemia.

Key words: Histopathology, hormones, obesity, lipid profile, liver enzymes, red ginseng.

Antibacterial and Antioxidant Activity of Some Medicinal Plant Extracts Grown in South Jordan.

Sharaf Omar¹, Khaled Al-tarawneh, and Husni Al-tawara,
¹Al-Balqa' Applied University, Faculty of Agricultural Technology, Dep. Of Nutrition and Food Processing, Jordan.

Abstract: The effect of methanol and ethanol of eleven plant extracts was tested against four bacterial isolates: Escherichia coli, Staphylococcus aureus, Listeria monocytogenes and Clostridium prerfirngen. The antibacterial activity against Gram positive bacteria was noticed with extract from the following plants: Sarcopterum spinosum L, Parochia argentea Lam, Artemisia seiberi, Achillea fragrantissima (forssk) and Teucrium poliumL. The minimum inhibitory concentration (MIC) for methanol plant extracts of S. spinosum against C. prerfirngen and S. aureus was 0.25 mg/ml while the MIC for T. Polium and A. fragrantissima against L. monocytogenes was 0.45 mg/ml. In ethanol extract the MIC was 0.20 mg/ml for S. spinosum against C. prerfirngen and 0.45 mg/ml for A. fragrantissima and A. seiberi against L. monocytogenes. The phenolic content in methanol and ethanol plant extracts were (8.5- 194.9) and (12.1- 252.4) in mg Gallic acid equivalent (GAE) respectively. The extract of S. spinosum and A. fragrantissima contained high and low amount of total phenolic compound respectively. A high antioxidant activity was obtained with extracts of the following plants: S. spinosum, A. fragrantissima, A. seiberi, T. Polium, Arum hygrophyllum (A. hygrophyllum) and Matricaria aurea (Loefl.) (M. aurea). These extracts inhibited lipid peroxidation in the ratios near or reach the inhibition of vitamin E. Finally there was low relation between antioxidant activity and phenolic content.

Key words: Antibacterial, antioxidant, medicinal plant extracts, Clostridium prerfirngen, Escherichia coli, Listeria monocytogenes, Staphylococcus aureus.
1.88 Secondary Metabolites and Free-Radical Scavenging Activity of the Endemic Species Stachys mialhesi de Noé.

Souheila LAGGOUNE¹, Assia ZEGHIB¹, Francisco LEON², Ignacio BROUARD², Jaime BERMEJO², Claude-Alain CALLISTE³, Jean-luc DUROUX³, Ahmed KABOUCHE¹, and Zahia KABOUCHE¹*

¹Laboratory of Therapeutic Substances (LOST), Department of Chemistry, Faculty of Sciences, University Mentouri - Constantine, Chaabet Ersas Campus, 25000 Constantine, Algeria. ²Instituto de Productos Naturales y Agrobiología -C.S.I.C.- Instituto Universitario de Bioorganica “Antonio González”, Universidad de La Laguna, Av. Astrof. Sánchez 3, 38206 La Laguna, Tenerife, Spain. ³Laboratoire de Biophysique, UPRES EA-1085, Biomolécules et cibles cellulaires tumorales Faculté de Pharmacie, 2 rue du Dr. Marcland, 87025 Limoges Cedex, France.

Abstract: One diterpenoid, horminone (1), two flavonoid glycosides, apigenin-7-O-(6''-E-p-coumaroyl)-β-D-glucopyranoside (2), isosculetarein-7-O-(2''-O-6'''-O-acetyl-β-D-allopyranosyl-β-D-glucopyranoside (3), were isolated from n-butanolic extract of the aerial parts of Stachys mialhesi de Noé. Two sterols, stigmasterol (4) and β-sitosterol (5), two lignans, (+)-sesamin (6), new for the genus Stachys and (±)-paulownin (7), new in the Lamiaceae family, reported for the second time from a natural source, and one acetylated flavones glycoside isoscutellarein-7-O-(2''-O-6'''-O-acetyl-β-D-allopyranosyl-β-D-glucopyranoside (3), were isolated from the roots of Stachys mialhesi de Noé. Surprisingly, 3g of compound (3) are gathered from 5g of roots extract. Their structures were established on the basis of physical and spectroscopic analysis, and by comparison with the literature data. The free-radical-scavenging property of the BESM and the compound (3) were evaluated by the use of the Electron Spin Resonance (ESR) method in order to visualize the inhibition of the 2,2-diphenyl-1-1-picrylhydrazyl (DPPH) free radical. Our results showed that S. mialhesi de Noé might be a source of natural antioxidants. The performed test confirmed that antioxidant potential of the plant, representing by an abundant flavonoid glycoside (3) in its root extract with a fairly high IC₅₀ value (0.066 ± 0.002 (mg/ml)) to scavenge DPPH free radical.

Key words: Free radical scavenging activity, lamiaceae, lignans, Stachys mialhesi de Noé.

1.89 Lipolysis Activity of Herbal Extracts and Nano Formulation for Cellulite Treatment.

Sucontphunt Apirada, Ondee T., Chutoprapat R., Chansriniyom C. and Nimmannit U.

National Nanotechnology Center (NANOTEC), National Science and Technology Development Agency (NSTDA), Klongluang, Pathumthani 12120, Thailand.

Abstract: Obesity is characterized by increasing of the number or size of fat cells (adipocytes), or a combination of both. Localization of adipose deposits and edema within the subcutaneous tissue caused cellulite which been described as resembling an orange peel-like appearance. Approximately 85% of postadolescent women have some degree of cellulite. Therefore, the objective of this study is to find natural ingredients that promote lipolysis to reduce cellulite occurrence for incorporation in nano-cosmetic product for cellulite treatment. Selected herbs were extracted with ethanol and then the supernatant were evaporated until dryness. Adipocytes were maintained in 96 well-plate at 37°C in a humidified 5% CO₂ atmosphere. Various concentrations of herbal extracts were treated to adipocytes at 37°C for 3 h. Lipolysis activity was determined by measurement of free glycerol occurred from lipolysis using free glycerol determination kit. Various Thai herbs were investigated for their lipolysis activity. It was found that extracts of Allium sativum and Piper nigrum significantly increased lipolysis activity of adipocytes. At the concentration of 10 µg/ml, Allium sativum extract exhibited the highest lipolysis activity (142%). Therefore it was selected to be the active ingredient in nano-cosmetic product for cellulite treatment. Nanosomes having the size in nano-meter range that could enhance the penetration of active
ingredient were developed. Nano-niosomes containing *Allium sativa* encapsulated with sorbitan monooleate (0.3%) and PEG400 (1%) has the average particle size of 171 nm and exhibited excellent stability after heating-cooling 6 cycles, at room temperature, and at 40 °C for 1 month. Particle size of selected formulation in all tested conditions was changed within the range of $\pm 7.07\%$. *Allium sativum* extract exhibited the highest lipolysis activity. Therefore, it was selected to be the active ingredient in nano-niosome for cellulite treatment. Nano-niosomes containing *Allium sativum* extract encapsulated with sorbitan monooleate (0.3%) and PEG400 (1%) has the particle size lower than 200 nm and exhibited excellent stability after heating-cooling 6 cycles and room temperature of 40 °C for 1 month.

**Key words:** Cellulite treatment, herbal extracts, lipolysis, nano formulation.

### 1.90 Studies on the Antioxidant and Antibacterial Activities of *Swertia chirata* (Bush ham) plant Extracts Using In Vitro Models.

**Syed Ali Raza Naqvi**$^1$, Zulfiqar, A. K$^1$, Sohail, A. S$^2$, Muhammad, Y$^3$, Qurat-Ul-A$^4$, and Nasir M$^4$.

$^1$Department of Chemistry, Government College University. $^2$Department of Chemistry, COMSATS Institute of Information Technology. $^3$Interdisciplinary Research Center in Biomedical Materials, COMSATS Institute of Information Technology. $^4$Department of Allied Health Sciences, University of Health Sciences, Lahore-PAKISTAN

**Abstract:** Like many other plants and herbs, *Swertia charata* has also been used for treating different infections and diseases particularly liver disorder. Anti-diseased function of most of the plants or herbs extracts has been associated with its antioxidant and anti bacterial potential. This study was performed to explore the antioxidant and antibacterial activity of the *Swertia charata* (Bush ham) endemic to the central Punjab of Pakistan. This was done by measuring possible constituents responsible for its anti-oxidant activity e.g. DPPH radical scavenging potential, total phenolic contents, reducing power, total flavonoide contents, and antibacterial power against four different strains of gram positive and gram negative bacteria. The antioxidant activity of methanolic and ethanolic extract of plant using DPPH model showed 84.32% and 82.54% respectively. Total phenolic contents of both extracts showed 2.565g (GAE)/100g and 1.612g (GAE)/100g was noted, respectively. Measured values of all these constituents explain strong anti-oxidant activity of the plants. HPLC analysis of plant extracts exhibit promising concentration of phenolic contents. Further the antibacterial activity indicates best possible use of this plant extract against infectious diseases in addition to diseases associated with oxidation process.

**Key Words:** Antioxidants, free radical, HPLC, antibacterial activity, total phenolics, swertia charata.

### 1.91 Chemical composition of the Essential oils of *Daucus reboudii* and their Antibacterial Activity

**Tahar Smaili**$^{1,2}$, Amar Z$^2$, Khellaf R$^1$, Ghadbane M$^1$, Abdelwahab B$^1$, P. C$^3$ and Guido F$^3$.

$^1$Département de Sciences de la Nature et de la Vie , Faculté de Sciences, Université de M'sila , 28000 M'sila. $^2$Laboratory of Biomolecules and Plant Breeding, Life Science and Nature Department, Faculty of Exact Science and Life Science and Nature, University of Larbi Ben Mhidi Oum El Bouaghi, Algeria. $^3$Dipartimento di Scienze Farmaceutiche, Sede di Chimica Bioorganica e Biofarmacia, University of Pisa, Via Bonanno 33, 56126 Pisa, Italy

**Abstract:** The essential oils obtained from aerial parts of *Daucus reboudii* Coss. (Apiaceae) which is endemic to north Africa collected from National Park of Gouraya (Bejaia, Algeria) were analyzed by GC/MS. 28 compounds were identified accounting for 97.8% of the total oil, the result
shows the dominance of the phenylpropanoids derivatives. (E)-anethol (59.4%) was the main constituent identified in the essential oil, followed by estragol (21.2%) and dodecanal (4.4%). The antibacterial activities of the Essential oils were assayed by using the agar diffusion method on Echerichia coli, Salmonella enteritidis and Staphylococcus aureus.

**Key words**: Antibacterial, Apiaceae, Daucu reboudii coss., essential oil, GC/MS, (E)-anethol.

### 1.92 Antifungal Activity of Extract of *Pistacia atlantica*

**Taxanna, A., F. Thameur., R. mohsen Maha, and Larous.L.**

*Faculty of natural science and life, university of Farhat abasse, Algeria.*

**Abstract**: Antifungal activity of essentials oils and polyphenols of *Pistacia atlantica* leaves collected in locality from Djelfa(algeria) was tested in vitro on six isolates of fungi species (*Aspergillus flavus, Aspergillus niger, Apergillus parasiticus, Alternaria alternata, Fusarium moniliforme, Mauginiella scaettae*). Diffusion discs method was used for antifungal activity of essentials oils and polyphenols. The essential oils showed antifungal activity against *Fusarium moniliforme* and *Mauginiella scaettae* at the concentration of 10-20ul/ml. In another hand ,the isolate of *Aspergillus flavus* showed resistance to essentials oils tested. The polyphenols showed strong activity against *Mauginiella scaettae* and *Fusarium moniliforme* at concentration of 10-20ul/ml in the presence of polyphenols results showed that an Antifungal activity against *Alternaria alternata* with MIC lower than 12ug/ml and MFC 12ug/ml. and *Mauginiella scaettae,Fusarium moniliforme* with a MIC lower than 50ug/ml and MFC more than 50ug/ml . *Aspergillus parasiticus* showed resistance to polyphenols.

**Key words**: Antifungal activity, essentials oils, leaves, *Pistacia atlantica*, polyphenols.

### 1.93 Antioxidant, Anti-lipid Peroxidation and Anti-Hemolytic Effect of *Centaurea calcitrapa* L. Extracts

**TRABSA H., BAGHIANI A., BOUSSQUALIM N., KRACHE I., BOUMERFEG S. CHAREF N., and ARRAR L.**

*Laboratory of Applied Biochemistry; Department of biochemistry Faculty of natural and life sciences, University Ferhat Abbas of Setif.*

**Abstract**: In the present study, aerial part of *Centaurea calcitrapa* L. were extracted with solvent of varying polarity allowed their separation into three main subfractions, the analysis of methanol crud (CrE), chloroform (ChE) and ethyl acetate (EaE) extracts, showed that the EaE contains the highest amount of flavonoids (50,71 ± 0,65 mg Eq Rutin / g dry extract and 31,96 ± 0,39 mg Eq Quercetin / g dry extract), followed by ChE (30,96 ± 0,55 mg ER / g dry extract and 19,38± 0,33 mg EQ / g dry extract), and CrE with 27,29 ± 0,18 mg ER / g dry extract and 17,16 ± 0,11 mg EQ / g dry extract. The β-carotene / linoleic acid bleaching assay revealed that the extracts have a very important antioxidant activity. The results showed that CrE has the highest antioxidant activity, followed by EaE and ChE with 95.00 ± 3,48 %, 86.43 ± 2,48 % and 80.44 ± 0,19 %, respectively. Using DPPH assay, the highest activity was observed with EaE (IC50 = 0,037 ± 0,0006 mg / ml), followed by CrE and ChE with IC50 of 0,109 ± 0,0009 and 0,290 ± 0,0053 mg / ml, respectively. The antioxidant activities of the CrE is confirmed by an in vivo assay in mice, using two doses orally administrated: Cr dose 1 (CrD1: 50 mg/kg/day), Cr dose 2 (CrD2: 100 mg/kg/day) during 21 days. Total antioxidant capacity of plasma and red blood cells was measured by using DPPH radical and from the kinetics of hemolysis, respectively. All treated groups compared with native control (GCtl) and the treated with vitamin C (GVit C) groups, CrD2 group showed a strong scavenging activity using DPPH assay (51,64 ± 7,82 %), higher than that of GVit C (47,27 ± 6,78 %) and CrD1 group (45,95 ± 6,26 %). The half-life (HT50), which corresponds to 50% of cell lysis was calculated from the kinetics of hemolysis obtained, the results showed that both groups treated with plant extract had a protective effect against erythrocytes hemolysis (CrD2: HT50=
167.3 ± 3.72 min), comparable to GVit C (HT50= 163.4 ± 9.10 min) and largely higher than the native control (HT50= 147.7 ± 0.40 min). All results confirmed that the extracts have a dose dependent effect on the growth of overall antioxidant defenses. This results supports the use of this plant against anti-inflammatory diseases in traditional medicine.

**Key words:** Antioxidant activity, Centaurea calcitrata, DPPH, flavonoids, hemolysis.

### 1.94 Plant Components Exhibit Pharmacological Activities and Drug Interactions by Acting on Lipid Membranes

_Tsuchiya Hironori¹ and Mizogami Maki²_

¹Department of Dental Basic Education, Asahi University School of Dentistry, Mizuho, Gifu 501-0296, Japan and ²Department of Anesthesiology and Reanimatology, University of Fukui Faculty of Medical Sciences, Eiheiji-cho, Fukui 910-1193, Japan.

**Abstract:** The medicinal benefits of numerous plants are attributable to phytochemical components like flavonoids, capsaicinoids, stilbenoids, allyl sulfides, etc., which are best known for having antiproliferative and antioxidant properties. In light of a novel mode of action on lipid membranes, we studied such pharmacological activities of plant components and verified their possible interactions with membrane-acting drugs. Fluorescence polarization measurements with different probes revealed that 1-50 μM phytochemicals acted on biomimetic membranes prepared with phospholipids and cholesterol of varying compositions. They structure-dependently changed the physicochemical property, fluidity, of membranes by preferentially affecting the deeper regions of lipid bilayers. In the structure and membrane activity relationship, greater potencies to change membrane fluidity were closely associated with the polyphenol structure, especially flavonoids with hydroxyl groups at the 3-, 3”, 4”, 5-, 5”- and/or 7-position. Quercetin and (-)-epigallocatechin gallate, meeting the structural requirements, effectively inhibited at 1-10 μMboth the proliferation of tumor cells (inhibition (%) against cell proliferation after 24 and 48 h culture: 23.3 ± 5.5 and 74.3 ± 5.7 for quercetin and 31.3 ± 6.2 and 75.5 ± 0.6 for (-)-epigallocatechin gallate) and the peroxidation of membrane lipids (inhibition (%) against 10 and 50μM peroxynitrite-induced lipid peroxidation: 100±0.1 and 74.6±0.1 for quercetin and 96.8±0.1 and 74.9±0.2 for (-)-epigallocatechin gallate). These antiproliferative and antioxidant phytochemicals also changed the fluidity of cell membranes simultaneously with exhibiting pharmacological activities. The membrane action is, at least in part, mechanistically responsible for the disease preventive and therapeutic effects of medicinal plants containing such phytochemical components. Among the tested membrane-active phytochemicals, 25-500 μM phloretin and capsicain concentration-dependently decreased or increased the membrane-fluidizing effects of lidocaine and bupivacaine of clinically relevant concentrations (increase (%) of anesthetic membrane effects: 205.5 ± 1.5 for lidocaine and 125.6 ± 1.0 for bupivacaine). These results suggest the possibility that medicinal plant components may antagonistically or synergistically interact with local anesthetics by acting on lipid bilayers to modify the membrane environments for sodium and potassium channels embedded in biomembranes.

**Key words:** Antioxidant, antiproliferative, drug interaction, lipid bilayer, membrane fluidity.

### 1.95 Isolation and Purification of Antifungal Compounds from Cyanobacteria (Spirulina platensis)

_Vinay kumar, A.K.Bhatnagar and J.N.Srivastava*

Department of Botany, Faculty of Science, Dayalbagh Educational Institute, Dayalbagh, Agra-282110

**Abstract:** Pathogenic fungi constitute an important public health problem as yet unresolved. In most African countries, traditional phytomedicines are used to control the disease. Various algae are known for their various biological activities. In the present investigation _Spirulina platensis_ was tested for antifungal activity for in vitro at different concentration against three clinical isolates of pathogenic fungi i.e., _Candida albicans_ MTCC-227, _Microsporum canis_ MTCC-3270, and _M. fulvum_ MTCC-7675). Therefore, the main objective of this work was to look for active substances that could be used as antifungal agents. To achieve this target, two different extract (Methanol and
Acetone) from *Spirulina platensis* was examined. The algal extracts were tested in vitro for their antifungal effects using Agar well diffusion method and Paper disc diffusion method and concentration from 250ppm up to 7000 ppm was taken and observed all these bacteria showed inhibition in growth by these extracts. During GC-MS analysis and NMR analysis the effective antifungal compound was identified as fatty acid compound associated with the antifungal properties.

**Key words:** Algal extracts, diffusion, fungi, growth, phytomedicines, *Spirulina platensis*.

### 1.96 Antibacterial Activity of Tea, Origano and Ginger Extracts

**Zerroug Mohamed Mihoub**, Bouriche Hamama, and Senator Abderrahmne

1Laboratory of Applied Microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbas of Sétif. 2Laboratory of Applied Biochemistry, Faculty of Natural and Life Sciences, University Ferhat Abbas of Sétif, Algeria

**Abstract:** Natural drug resistance to human pathogenic bacteria has been commonly reported from all over the world. This fact urged to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action. Many plants which are used in traditional medicine are considered as a source of antimicrobial compounds. In this study, the antibacterial activity of aqueous extracts obtained by infusion or decoction of tea (*Camellia sinensis*), origano (*Origanum glandulosum*) and ginger (*Zingiber officinalis*) were tested against *E. coli* MC 4100 (NCTC 9002), *Pseudomonas diminutus* (NCTC 8545) and *Paracoccus paratrophus*. Bacterial suspensions (100 µl) were spread on tryptone soya agar (TSA) medium. Plant extracts (10 µl) were applied to discs of filter paper and placed on agar plates containing the microorganisms. The plates were incubated at 37°C for 48h. After incubation the zones of inhibition around the discs was measured. Results showed that the plant extracts inhibited bacterial growth, tea extract inhibited the growth of the three bacteria with zones of inhibition of 10 mm for *E. coli*, *Paracoccus paratrophus* and 11 mm for *Pseudomonas diminutus*. Ginger infusion gave zones of inhibition against *E. coli* and *Pseudomonas diminutus* of 10 mm. In contrast, origano infusion inhibited only *E. coli* by 9 mm. Tea decoction inhibited the growth of *E. coli* and *Paracoccus paratrophus* with 11 and 9 mm, respectively. While ginger and origano extracts had no antibacterial effect.

**Key words:** Antibacterial activity, ginger, origano, tea.

### 1.97 Neuroprotective Effect of *Curcuma Longa* Administrated with *Pepper nigrum* Against Aluminium Neurotoxicity and Alzheimer’s Disease (Experimental Studies in Mice)

**ZERROUKI Khayra,** and **DJEBLI Noureddine**

Department of biology, Faculty of exact science and natural and life science, University of Mostaganem, Mostaganem-Algeria

**Abstract:** Chemicals with neurotoxic effects are found to be very different, citing the aluminum which can cause serious consequences, not only on the nervous system but also on other organs (liver, kidneys, bones ...). The presence of aluminum in the internal medium (blood) can take only a few hours, but with sub-acute exposure to chronic, this metal can be stored in several tissues (liver, bone, cartilage, nervous ... ) causing serious complications can go to the molecular level and resulted in tumor diseases and irreversible damages. Currently, the toxicity of aluminum is well established in the animal laboratory, and the neurotoxic effect is studied by means of behavioral tests, memory tests, histological and biological analysis. Several means were considered to fight against this severe health problem, including, herbal medicine which is based on the effectiveness of the antioxidant effect on lesions induced by metals. *Curcuma longa* is a powerful antioxidant used to reduce the damage causes by aluminum; it shows a protective effect against neurotoxicity, a large effect against antioxidative stress inhibiting the reactions cascade of neurofibrillary tangles, it’s classed between therapeutic agents fight against neurodegenerative disorders and Alzheimer’s...
disease induced by AlCl3 on the pyramidal cells in cerebral cortex and hippocampus of albino mice; but it’s less bioavailability and it’s fast eliminated by the liver detoxification pathways, obliged there administration with piperine exist in Pepper nigrum, inhibitor of the key enzyme involved in detoxification, which helps maintain a high rate of curcumin (Curcuma longa) longer. Our aim is realized by means of two experiences with a different exposition of albino mice; sub acute and chronic exposure with a different manner (Oral and IP) on Curcumin with a Pepper as a fixative of absorption and AlCl3.

**Key words:** Aluminum, alzheimer disease, antioxidant, Curcuma longa, neurotoxicity.

1.98The Search of Plants with Expressed Therapeutic Activity among the Cabbage Family

**Zinchenko, Iryna., Tartynska, G., Kolisnyk, Y., and Kyslychenko, V.**

*National University of Pharmacy, Kharkiv, Ukraine*

**Abstract:** For centuries plants have been used by people all over the world due to their healing properties. Nowadays, when the pharmaceutic industry proposes more and more effective drugs, the usage of medicinal plants doesn’t lose its actuality. The plants from the Brassicaceae family are a good source of natural antioxidants due to the high levels of carotenoids, tocopherols, phenolic compounds, and ascorbic acid, which help to protect the human body against damage by reactive oxygen. The consumption of Brassica vegetables has been related to the reduction of the chronic diseases risk, and also diseases of cardiovascular system and cancer. In addition, plants from the Brassicaceae family are very nutritive, providing nutrients and health-promoting phytochemicals such as vitamins, carotenoids, fiber, soluble sugars, minerals, glucosinolates and phenolic compounds. Taking into account all the above mentioned advantages of these plants, the study of the Brassicaceae family representatives as prospective sources of biologically active compounds with expressed therapeutic activity is carried out at the department of the chemistry of natural compounds of the National University of Pharmacy (Kharkiv, Ukraine). The shepherd’s purse (Capsella bursa-pastoris) herb is used in official medicine as a styptic agent in uteral, intestinal, nephritic, and pulmonary bleedings. The plant is also known to possess antibacterial and antioxidant properties. Field penny-cress (Thlaspi arvense) is an unofficial plant but it has been widely used in folk medicine as a styptic, cytostatic remedy, and which also has slight expectorant properties. It is used in cardiovascular, gastrointestinal diseases, it is also recommended in ovaritis and sexual impotence in men. The study carried out at the departments of the chemistry of natural compounds and pharmacology of the National University of Pharmacy has shown the field penny-cress to possess prostate-protective, anti-inflammatory and antimicrobial properties. Due to the presence of a large plant material base our attention was attracted to tyfon (Brassica campestris var. chinensis DC × Brassica rapa L.) – a hybrid of Chinese cabbage and turnip. The study of its chemical composition has shown the presence of such groups of biologically active compounds as sugars, polysaccharides, vitamins, organic acids, flavonoids, hydroxycinnamic acids, polyphenols, and steroidal saponins. At present the tyfon herb extract is being worked out which has anabolic properties. From all the above mentioned it can be concluded that these representatives of the Brassicaceae family are a prospective source of new phytoremedies.

**Key words:** Cabbage, plant, therapeutic activity, tyfon herb.
1.99 *In Vitro* Hypoglycemic Activity of Methanolic Extract of Some Indigenous Plants

Zuberi, M. Hashim\(^1,2\) Siddiqui, Farhan A\(^2\), Mirza, A. Zeeshan\(^2\), Arayne M. Saeed\(^1\) and Sultana, Najma\(^2\)

\(^1\)Department of Chemistry, Federal Urdu University for Arts, Science and Technology. \(^2\)Department of Chemistry, University of Karachi

**Abstract:** Pakistan is rich in medicinally important plants and has ancient herbal treatment methods. Present work is based on the study of six indigenous plants *Eugenia jambolana*, *Lawsonia inermis*, *Momordica charantia*, *Morus alba*, *Nigella sativa* and *Trigonella foenum graecum* which show the inhibitory effect of glucose utilization, and are in use as hypoglycemic agents of varying degree in traditional system of medicine. The glucose uptake activity of (methanolic extracts) of these plants was tested in vitro and glucose was estimated by glucose oxidase method. The results in three different media revealed that hypoglycemic activity is more prominent in neutral and basic media as compared to acidic medium. The plant materials were collected from the natural habitat of various localities of Karachi. Glucose Oxidase- Peroxidase kit was purchased from Bio Science, Barcelona Spain. All other chemicals used were of analytical grade. The present study clearly indicated the use of these plants as antidiabetic agents, for example, these herbs can be used as mono therapy or add-on therapy in diabetes management. Further more; their indiscriminate use by the patients may lead to possibility of hypoglycemia.

**Key words:** Hypoglycemic, indigenous plants, methanolic extract.
2.1 Traditional Medicine in Jordan and Newly Discovered Biological Activities of Some Medicinal Plants

Afifi, Fatma U.
Faculty of Pharmacy, University of Jordan, Queen Rania AlAbdullah Street, Amman 11942, Jordan

Abstract: Obesity is a major risk factor for cardiovascular, metabolic and endocrine disorders. The potential of developing successful lipid lowering phytochemicals from natural resources with anti-pancreatic lipase activity is poorly investigated. Presently, we have screened the crude aqueous extracts of a total of 12 medicinal plants, some of their aerial parts as well as isolated pure compounds- belonging to 9 different families, for their in vitro pancreatic lipase inhibitory propensities. Interestingly, none of these plants is used traditionally for their hypolipidemic activity. A colorimetric methodology was employed to evaluate the release of p-nitrophenol from p-nitrophenol butyrate substrate by pancreatic lipase catalytic activity. Enzyme activity was defined as an increase of absorbance per minute. Orlistat, as a reference drug, demonstrated a pronounced pancreatic lipase inhibition with an IC_{50} of 1.13 ± 0.3 ng/ml. The most active plant extracts showed an IC_{50} range of 27.3 ±9.7 μg/ml to 120±15.2 μg/ml. Most notably, some differences in potency were detected among the different parts of the same active plant. Moreover, the isolated pure compounds, such as quercetin, rutin and β-sitosterol, exhibited much more pronounced inhibitory effect on pancreatic lipase compared to their active crude plant extracts. The screening and optimization of safe and effective phytochemicals as potential lipid lowering agents would provide an excellent adjunctive therapy to the established pharmacological agents in management of obesity and its complications. Phytochemicals can modulate different stages of the adipocyte life cycle or adipogenesis. Novel phytochemical strategies may be formulated thereby translating active plant inclusion in healthy diet to the clinical practice for treatment/prevention of obesity.

Key words: Biological activities, Jordan, medicinal plants, traditional medicine

2.2 The Effect of Topical Application of Extra Virgin Olive Oil on Alleviating Knee Pain in Patients with Knee Osteoarthritis

Almalty Abdul-Majeed, Hamed Saja, and AbuTariah Hashem
Physical and Occupational Therapy Department, Hashemite University, Zarqa, Jordan

Abstract: To investigate the effects of topical application of extra virgin olive oil on the pain of osteoarthritic knee(s) and compare it with NSAID gel. Thirty patients with knee(s) osteoarthritis (Mean±SD, age=60.1±6.6, weight=85.4±5.5Kgs, height=169.4±5.6cm and BMI=29.8±2.1, 16 females and 14 males) were divided into three groups; Group A (n=10) treated with topical application of olive oil and exercise, group B (n=10) received topical non-steroidal anti-inflammatory drugs (Ketoprofen gel) over the knee(s) and exercise, and group (C) received therapeutic exercise only. Topical olive oil (3ml) and ketoprofen gel (3 cm²) were applied three times a day followed by therapeutic exercise for groups A and B respectively. Group C only received therapeutic exercise as the other two groups three times a day. VAS and WOMAC index measurement were taken at baseline and after two weeks of treatment. All groups showed significant improvement (p<0.001) in VAS and WOMAC index after two weeks of treatment compared to the baseline. Group comparison showed no significant difference in both scales between groups A and B (p>0.05), however, both groups significantly experienced less pain than group C (p<0.001). Topical application of extra virgin olive oil proved to be effective in alleviating the symptoms of patients diagnosed with knee osteoarthritis as much as topical application of NSAID.

Key words: Extra virgin olive oil, knee pain, osteoarthritis, patients, topical application.
2.3 Ethno Botany's Study, Phyto-Chemical Characterization and Healing Effect of *Carthamus coerulescens* Rhizomes

**BENHAMOU AMINA.**, and **FAZOUANE FETHIA**
Food technology research laboratory-University of Boumerdes-Algeria.

**Abstract:** Objective of this study is *Carthamus coerulescens* (Asteraceae) a medicinal plant in the region of Baghilia (Algeria), ethno botany's study, phytochemical characterization and healing effect of her rhizomes. From 74, 98% of respondents were able to identify 66.66% women aged above 44 years who use this plant frequently for healing and therapy of different degrees' burns. We conducted a characterization study of rhizomes through a phytochemical screening that reveals the presence of alkaloids, leuco anthocyanins, flavonoids, coumarins, saponins and absence of anthocyanins, tannins, and iridoids. To study the healing effect, we chose to formulate healing cream-based Total rhizomes of *C. coerulescens* with participation of qualified person in this area. This cream was applied to Wistar rats in which wounds and burns were caused by incision and burn of 2nd degree, respectively. Healing and cell regeneration of the burnt skin and the wound closure caused, had resulted in the reduction of area. Monitor these areas over time has allowed us evaluation of decreasing diameter for 15 days with a percentage reduction of 85.66% in rats treated with our cream rhizomes *Carthamus coerulescens*, this being higher than that found in the rats treated with ointments and reference whose value is of 75.12%. The histopathological study has confirmed the effectiveness of the cream prepared by the regeneration of epithelial tissue, which means a good epithelialization of scar tissue.

**Key words:** *Carthamus coerulescens*, epithelialization ethno botany's study, healing, phytochemical, histopathological, scar tissue.

2.4 Contradiction of Therapeutic Indications of Community Herbal Monographs and their Ethnobotanical Background

**Bernáth Jenő and Németh Éva**
Corvinus University of Budapest, Department of Medicinal and Aromatic plants, Hungary

**Abstract:** The category of Traditional Herbal Medicinal (THMPD) Products was established by the European Parliament to provide a simplified regulatory approval process for traditional herbal medicines in the European Union. The products that belong to this category are actually medicines for use in specified indications exclusively based upon long-standing use. What the long-standing use does mean a question. To answer the question the indications described in Community Herbal Monographs are evaluated in respect of the ethnobotanical knowledge accumulated during the centuries. The therapeutic indications of 28 plant species finalized in Community Herbal Monographs are analysed in this respect taking into consideration international ethnobotanical databases. It is obvious from the analysis that the official Monographs restrict the application fields of the plant species in a great deal, comparing to the traditional application forms. According to the number of accepted therapeutic indications the analysed Monographs can be sorted into four groups: a) 12 documents with one official therapeutic indications, b) 8 documents with two indications, c) 6 documents with three indications, d) 2 documents with four therapeutic indications. The restriction of therapeutic fields made in the Monographs is rather strict if we would compare it to the large number of ethnobotanical claims. For instance in the case of *Arctium lappa* L., *Foeniculum vulgare* (Mill.) subsp. *vulgaris* var. *vulgaris* and *Achillea millefolium* L., more than 60 ethnobotanical claims are recorded. To the group of species utilized worldwide expansively belong *Capsella bursa-pastoris* (L.), *Hedera helix* L., *Mentha x piperita*, *Juniperus communis* L., *Taraxacum officinale* Weber ex Wigg., *Calendula officinalis* L., *Hypericum perforatum* L., too, with 44-45 ethnobotanical references, each. The contradiction of the therapeutic indications of Monographs to the ethnobotanical application form is larger if the number of ethnobotanical claims is large. As an example, the "folium" of *Mentha x piperita* according to the Monograph can be used for the symptomatic relief of digestive disorders such as dyspepsia and flatulence, only. In contrast according to the ethnobotanical data the plant is rather effective additionally for curing ache (stomach), bronchitis, cold, colic, cough, nasal catarrh, nausea, nervine, rheumatism,
sclerosis (limb), sore throat, toothaches and also effective as antiseptic, topical analgesics and can be used as vermifuge. However, there is a hope for further harmonization of the Monographs and the ethnobotanical knowledge, because of the decision of European Commission the Monographs need to be periodically updated evaluating data from the literature in order to prevent Monographs from becoming outdated.

Key words: Herbal medicine, monographs, therapeutic.

2.5 Survey of Medicinal Plants from National Park of Gouraya (Bejaia, Algeria) and Their Usage in Traditional Medicine

Bouadjil Hadjira¹ and Bounechada Mustapha²
¹University of Ferhat Abbès, Faculty of Natural and Life Sciences, Department of Ecology and Biological Vegetal, Setif. ²University of Ferhat Abbès, Faculty of Natural and Life Sciences, Research Laboratory ADPVA, Setif, Algeria.

Abstract: This study was conducted 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. This work reported the results of ethnobotanical survey in national park of Gouraya conducted during year 2011-2012. Many medicinal plants were recorded and their ethnobotanical aspects were discussed. This survey shows that plants used in the traditional medicine being major source of treatment of some diseases in different parts of Algeria. This study may be also a guide of phytochemical and pharmacological analysis and it can enhance the conservation of plant biodiversity of this protected area.

Keys words: Algeria, biodiversity.ethnobotany, Gouraya National Park, traditional algerian medicine,

2.6 Ethnobotanical Survey of Plants Used in the Traditional Treatment of Hypertension in Setif Region (Eastern Algeria).

BOUAZIZ Amel, KHENNOUF Seddik, BENTAHAR Assia, DAHAMNA Saliha and AMIRA Smain
Laboratory of Phytotherapy Applied to Chronic Diseases, Department of Biology and Animal Physiology, Faculty of Nature and Life Sciences, University Ferhat Abbas, Setif, 19000, Algeria.

Abstract: Ethnopharmacological surveys carried out in many parts of the world, including Algeria, have identified hundreds of plants used in folk medicine for the treatment of hypertension, and studies in experimental animals have confirmed the ethnomedical use of some of these plants. In this study, the medicinal plants used in the treatment of hypertension were inventoried based on the ethnopharmacological survey in eastern Algeria: Setif region. 1100 persons including 510 patients with hypertension and 44 traditional herbal healers were interviewed in different areas of Setif. The inventory of medicinal plants is summarized in a synoptic table, which contains the scientific, vernacular and common name of the plant, the part of the plant used, the preparation and mode of administration. Extensive investigations have brought to light 71 medicinal plants belonging to 36 families. The most common plant families were Lamiaceae (>15%), Asteraceae (>13%), Apiaceae (>8%); the most common preparations were infusion and decoction. In this region, the survey shows that the most frequently used plants to treat hypertension include Mentha spicata, Olea europaea, Allium sativum, Petroselinum crispum, Artemisia herba alba, Laurus nobilis, Rosmarinus officinalis, Eucalyptus globulus, Marrubium vulgare, Origanum glandulosum, and crataegus azarolus.

Key words: Algeria, Hypertension, ethnobotanical survey, medicinal plants.
2.7 Herbal Medicine and the Role of Ethnobotany

Caroline S. Weckerle  
Institute of Systematic Botany, University of Zurich, Switzerland

Abstract: In the past, ethnobotany played an important role for the discovery of new drugs. Today, it focuses on a broad variety of subjects which are often subsumed as human-plant-interactions. This presentation focuses on the relationship between ethnobotanical research and herbal medicine in a globalized world. With case studies from Europe and China it highlights the role of traditions, regulations, and the market on the knowledge and use of medicinal plants in rural and urban contexts. Based on these examples, it deducts a variety of roles ethnobotanical research plays today.

Key words: Drugs, herbal medicine, ethnobotany, research, role.

2.8 Plant Remedies Used for Infectious Diseases by A Rural Community in South Africa

De Wet Helene¹ and Van Vuuren Sandy²  
¹Department of Botany, University of Zululand, Private Bag X1001, KwaDlangezwa 3886.  
²Department of Pharmacy and Pharmacology, University of the Witwatersrand, 7 York Road, Parktown 2193, Johannesburg, South Africa

Abstract: The aims of this study were to document the ethnobotanical knowledge that lay people have about medicinal plants growing in and around the immediate vicinity of homesteads and perform in vitro antimicrobial testing to determine efficacy of traditional use. Interviews were conducted among 80 homestead inhabitants, using structured questionnaires where convenience sampling was undertaken. Furthermore, plant samples were collected in situ and tested using the minimum inhibitory concentration (MIC) assays against pathogens associated with respiratory, gastrointestinal and sexually transmitted infections (STI). The sum of the fractional inhibitory concentrations (ΣFIC) was determined for plants traditionally used in combination. The survey revealed that 23 plant species are used to treat diarrhoea, 30 species are used to treat respiratory infections and 33 plant species for STIs. It was also noted that plant combinations are frequently used in order to increase efficacy. Even though Lippia javanica was by far the most frequently used plant species (58 x for respiratory infections), no significant antimicrobial results were obtained thus demonstrating that frequency of use doesn’t necessarily correlate with the best activity. Noteworthy MIC values were found for Terminalia sericea, one of four plant species which are being used to treat all three infectious disease studies. The aqueous bark extracts of T. sericea demonstrated mean MIC values of between 0.38-0.83 mg/mL against diarrhoeal and respiratory pathogens. The indigenous tree Sclerocarya birrea (mentioned 24 x) has demonstrated the best overall activity against all three diseases with a mean MIC value of 1.38 mg/mL. A 1:1 combination of Syzygium cordatum bark (MIC of 2.00 mg/mL) and T. sericea leaves (MIC of 3.33 mg/mL) used for treating respiratory infections demonstrated an additive interaction against Mycobacterium smegmatis with ΣFIC value of 0.88. The rural inhabitants in this area, which is mostly women, prefer to use traditional medicine over allopathic medicine as it is free, easily accessible, more effective, no side effects and for cultural reasons. A diverse range of plants are used to treat the same symptoms - which primarily dependent upon plant availability in and around the homesteads. The results of this study validate the traditional use of some of the plant species to treat infectious diseases.

Key words: Infectious diseases, remedies, rural, South Africa.
2.9 Traditional Pharmacy – Attar's shop Model for Traditional Medicine

Edris Jaradat
Sanabel Center for Studies and heritage.

Abstract: The study aims to identify the mechanism that is used by traditional healer - Attar – who treats various illnesses using herbal plants and other formulations based on the mothers of old books and which were used by our parents and grandparents in folk remedies as well as the experience of Attar and personal experiences of others in the treatment of diseases and ailments. The study also aims to introduce the readers of the contents of Attar's shop - Shop Perfumery - Traditional Pharmacy, which are spread in all Palestinian cities, especially in the old markets The name "Attarine market" still exists in the old city of Hebron, Jerusalem and Bethlehem. The study followed a descriptive approach using interviews and field visit to the place of Al-Attar shop, as well as observation of the people visiting the Attar's shop and what they asked him, during my interview with Al-Attar, which lasts about an hour, twenty people entered the shop, so he cut the interview and to meet the requests of the customers, patients and people ordinary, who were seeking recipes, whether for them or to other patients. The study was conducted to find out the contents of the Attar's shop and the most important diseases and illnesses addressed by Attar. The results revealed that Al-Attar shop contains herbs and spices, mixtures of herbs and vegetable oils, lotions and creams and powders are prepared by al-attar himself or imported from outside of Palestine, such as India and Pakistan. Al-Attar addresses and describes the recipes for most illness and disease and bring their own blends. Al-Attar depends on the preparation of herbal mixtures through personal experiences or transfer from his father. Perfumery is inherited within the family and moves from father to son through tradition or practice. The percentage of the general public who visited Attar's shop, regardless of their scientific level is high, during my interview with him in Hebron, which lasts about an hour, about twenty people entered to ask for herbs and formulations for the treatment of diseases to them or to others. He describes the treatment of diseases of physical - and psychological and mental health. High proportion of the visitors are women who applied for powders and cosmetic treatment of skin that are attended or imported from outside of Palestine, as well as recipes for thinness and obesity. The study suggests the following recommendations: Opening a research center specializing in the analysis of medicinal herbs used by Al-Attar to demonstrate the risks and the degree of damage from them. Having an analytical study of data from the People's Pharmacy - Shop Attar - and the facts by the method of systems analysis inputs - processes - outputs. Conducting comparative studies of the experience with the experiences of Palestinian folk remedy in the Arab and foreign countries. Conducting studies to develop future scenarios for the future and pharmacy, which includes all medical supplies and prescription drugs popular. And conducting specialized studies in the People's Pharmacy and Publishing in the journals and conferences.

Key words: Attar's shop model, traditional medicine, traditional pharmacy.

2.10 Ethnomedicine in Slovakia – Medicinal Herbs in Folk Medicine and Magic Versus Their Current Usage

Eftimova Jarmila, Ciberej Juraj, and Stopkova Jana

1 University of Veterinary Medicine and Pharmacy in Kosice, Slovak Republic

Abstract: Knowledge comparison oriented on the utilization of selected plant group in folk medicine and magic in the past and their present application in phytotherapy and phytopharmacology in the Slovak regions. In the evaluation process were included 12 species of herbal plants. For any species were assembled data on their former utilization for healing of diseases and utilization in the current phytotherapy and phytopharmacology. In the same time were piled up the knowledge on use and/or disuse several other plant species in magic of different orientation – from that injuring to healing, protective or even dealing with the love affairs. In this study were complexely processed knowledge and experience pieces on the plants suitability and effects in former and nowadays phytotherapy concerning 12 plant species - Alchemilla xanthochlora Rothm., Sambucus nigra L., Betula pendula, Allium ursinum L., Crataegus
monogyna Jacq., Symphytum officinale L., Hypericum perforatum L., Eupharsia officinalis L., Artemisia absinthium L., Origanum vulgare L., Equisetum arvense L., Achillea millefolium L., Agrimonia eupatoria f. davurca (Link) Nakai, Matricaria recutita L., Plantago lanceolata L. Comparison of these date showed specific ability of these plants to cure several diseases. Traditionally those plants were applied by our ancestors in different forms for curing of diseases mostly correctly, although they could not know anything about the presence of biologically active substances detected by current analytical methods. The so called injuring magic were applied some species mostly for bewitching – causing some evil or harm to target person or animals (Vincetoxinum spp.). In protecting magic were utilized some plants like Artemisia vulgaris L., Inula helenium L. against the harming effects, for protection of property, crop and prevention of animal diseases and other unfavourable factors was Arctostaphylos uva-ursi L. recommended. Rosmarinus officinalis L., Ledum palustre L. and Lycopodium clavatum L. were the favourite plants in love magic. Based on the piled data a significant relevance is shown between the traditional knowledge of different regional inhabitants and the current use of these plants for the healing purposes in several forms – like teas, extracts, and/or commercial pharmaceutical products. Therefore this often nearly forgotten traditional knowledge represent and important indicator for the pharmaceutical production, especially when searching for suitable resources and raw material, which can be used in practice in many preventive programmes, health recovering and healing of many diseases.

**Key words:** Folk magic, ludové liečiteľstvo, medicinal herbs; phytopharmacology, phytotherapy, utilization.

### 2.11 Inventory of Plants Used in Hypoglycemic Pharmacopeia in Northern Sahara (In the Regions of Ouargla), Oued-Righ and Ziban

**HADJAIIDJI-BENSEGHIER Fatiha¹ and DERRIDJ Arezki².**

¹Laboratoires de bioressources Sahariennes, Départements des sciences agronomiques et de biologie, Faculté des sciences de la nature et de la vie et des sciences de la terre et de l'univers, Université de Kasdi Merbah, Ouargla, Algérie. ²Faculté des sciences biologiques et agronomiques, Mouloud Mammeri, Tizi-Ouzou, Algérie

**Abstract:** Diabetes is a widespread disease in Algeria. Indeed, in southeastern Algeria, especially the regions of Ouargla, and Oued Righ Zibans, are among the areas most affected by this disease. The aim of our study is to inventory the hypoglycemic plants consumed by the inhabitants the survey area. For this, our investigation has affected different categories of people. These have been collected into two groups in the survey. The first group consists of about sixty people resources among herbalists, pharmacists-plant, traditional practitioners and healers while the second group is formed by diabetics, a rate of ten percent (10%). The results revealed the use of 31 plants species for the treatment of diabetes. Frequency of use was the highest rated in the region of Ouargla. The infusion and the powder are the most common modes with the mixed use of plants. The seeds are the most consumed over different parts of plants. This study contributed to the identification of hypoglycemic plants that play a very significant traditions in medicine and in people’s lives, but it remains pioneer because the inventory is far from the most comprehensive. Every time she has given of importance to safeguarding of traditional medicinal system. To do this, the development of a strategy to preserve this ancient knowledge is imperative.

**Key words:** Diabetes, hypoglycemic plants, ethnopharmacology, investigation, oued-righ, ouargla.
2.12 Traditional Uses and Scientific Evidence for a Selected Native Medicinal Plant from Jordan: A Critical Evaluation of Achillea santolina

Kasabri, Violet, Afifi, Fatma U., Hamdan, Imad., and Abu-Dahab, Rana
Faculty of Pharmacy, University of Jordan, Queen Rania AlAbdullah Street, Amman 11942, Jordan

Abstract: Traditional plant treatments are used globally for the diabetes therapy. Achillea santolina L. (Asteraceae) is a traditional diabetes remedy in Jordan. The aim of the present in vitro and in vivo studies was to investigate the efficacy and the role of this indigenous plant’s aqueous extracts (AE) on the pancreatic β-cell proliferation and insulin secretion as well as extrapancreatic carbohydrate digestion and absorption as possible action mechanisms. Oral starch tolerance tests (OSTT) and oral glucose tolerance tests (OGTT) were determined for the plant AE at concentrations 125, 250 and 500 mg/Kg body weight versus acarbose or metformin and glipizide. Results showed that, dual inhibition of α-amylase and α-glucosidase, A. santolina dose gradient (1 - 100 mg/ml) did not affect any substantial reductions of corn starch digestion in vitro. Interestingly in starch-fed rats, in vivo acute postprandial antihyperglycemic efficacies were obtained for A. santolina (125 mg/Kg b.wt, P<0.001 vs. control untreated animals, n=5). None of A. santolina AE doses qualified for improving glucose tolerance in fasted rats on glucose loading, incomparable to glipizide and metformin hypoglycemic pharmacotherapeutic efficacies. Dissimilar to guar gum (50 mg/ml) diffusional hindrance in a simple glucose dialysis model, A. santolina (50 mg/ml) AE proved ineffective in impeding overnight glucose movement in vitro. Comparable to GLP-1-enhanced β-cell proliferation in 2-day treatment wells, a dose dependent augmentation of BrdU incorporation was obtained with the A. santolina AE (0.05-1 mg/ml, P<0.001-0.001, n=4) with respective 1.33 and 1.41 folds. Unlike L-alanine acute pancreatic secretory output and without deleterious effects on MIN6 viability, A. santolina AE lacked any insulinotropic effects. In conclusion, A. santolina may qualify as a potential source for antidiabetes adjunctive therapeutic strategies. However, Identification of other possible antidiabetes action modes along with bioactive phytoconstituents is warranted.

Key words: Achillea santolina, evaluation, Jordan, medicinal plant, therapeutic.

2.13 Traditional Uses and Scientific Evidence for a Selected Native Medicinal Plant from Jordan: A Critical Evaluation of Eryngium creticum

Kasabri, Violet., Afifi, Fatma U., Hamdan, Imad., and Abu-Dahab, Rana
Faculty of Pharmacy, University of Jordan, Queen Rania AlAbdullah Street, Amman 11942, Jordan

Abstract: Traditional plant treatments are used globally for the diabetes therapy. Eryngium creticum Lam. (Apiaceae) is a traditional diabetes ethnomedicine in Jordan. The aim of the present in vitro and in vivo studies was to investigate the efficacy and the role of this indigenous plant’s aqueous extracts (AE) on the pancreatic β-cell proliferation and insulin secretion as well as extrapancreatic carbohydrate digestion and absorption as possible action mechanisms. Oral starch tolerance tests (OSTT) and oral glucose tolerance tests (OGTT) were determined for the plant AE at concentrations 125, 250 and 500 mg/Kg body weight versus acarbose or metformin and glipizide. Results showed that Less effectively than acarbose E. creticum (500 mg/Kg b.wt, P<0.05-0.001, n=5) exhibited substantial acute antihyperglycemic activities in starch-treated rats, despite lacking any favourable in vitro inhibitory efficacy in enzymatic starch digestion. Interestingly, it did not qualify either for improving glucose tolerance in fasting rats on glucose loading unlike metformin or glipizide. Dissimilar to guar gum (50 mg/ml) diffusional hindrance in a simple glucose dialysis model, E. creticum (50 mg/ml) AE proved ineffective in impeding overnight glucose movement in vitro. Comparable to GLP-1-enhanced β-cell proliferation in 2-day treatment wells, a dose dependent augmentation of BrdU incorporation was obtained with the E. creticum AE (0.1, 0.5 and 1 mg/ml) by respective 1.31, 1.42 and 1.47 folds (P<0.001 vs. basal spontaneous controls, n=4). Similar to L-alanine insulinotropic efficacy in β-cell MIN6 and without deleterious effects on cytoviability, glucose-stimulated Ca²⁺ regulated insulin secretion was potentiated by AEs of E. creticum AE (0.01 mg/ml) by 198.3±22.1% (P<0.05, n=4). In conclusion, E. creticum qualifies
as a potential source for antidiabetes pharmacology leads or adjunctive therapeutic strategies. Identification of bioactive phytoconstituents is warranted.

Key words: Acarbose, β-cell proliferation, diabetes ethnomedicine, *Eryngium creticum*.

### 2.14 Ethnobotanical Study on Medicinal Plants and their Traditional Uses in Kabyla (Algeria)

**MEDDOUR, Rachid, MEDDOUR-SAHAR, Ouahiba and DERRIDJ, A.**

*Faculty of Biological and agricultural Sciences, Mouloud Mammeri University, BP 17 RP, 15 000 Tizi Ouzou, Algeria.*

**Abstract:** This study aims to assess ethnobotanical knowledge in Kabyla, focusing on the use of traditional medicinal plants. This region has remained relatively isolated and agro-industrial development did not cause a significant decline in traditional practices, including the use of plants in traditional medicine. Ethnobotanical information was gathered using a questionnaire among herbalists, traditional healers and local populations, within eight rural municipalities in the department of Tizi Ouzou. At all, 98 vascular plants were identified and recorded, a large majority of them live in a wild habitats (forests and wetlands, especially), with the exception of 6 crops. They belong to 48 families, the most represented are the *Lamiaceae* (13 species) and *Asteraceae* (12 species). The many diseases listed in the survey are grouped into 10 major disease groups. The mainly pathologies treated are those of the digestive system (40 plants), skin diseases (29 plants), circulatory system (24 plants) and respiratory system (21 plants). In contrast, the visual system, too precious, is treated with a single plant. The toxicity of some herbs used with caution is well known. Medicinal plants are often multipurpose plants (food, flavor, feed, veterinary, crafts, etc.). Moreover, 31 of these wild plants yet still have an interest in food for rural populations. Finally, a large majority of medicinal plants used in Kabyla, are also known for their therapeutic properties in the Mediterranean basin, e.g. 72 plants (73.5%) of this study are cited by the project Rubia (Gonzalez-Tejero et al., 2008). However, we must recognize the urgent need to collect ancestral medicinal know-how, especially since it is held by few and illiterate people (seniors over 60 years old). This ethnopharmacological knowledge constitute a world heritage for finding new resources (food, medicines, nutraceuticals) for the future, by putting acquired data at disposal of clinical and pharmaceutical research. But a consequent part of the financial fallout, from such an initiative, has to return to the holders of this knowledge, in equity within a global frame of socioeconomic development planned in the durability.

Key words: Algeria, ethnobotanical knowledge, Kabyla, medicinal plants, rural population.

### 2.15 Ethnomedicinal Anthelmintic Plants of Northern Pakistan

**Muhammad Zafar, Ghulam Mujtaba Shah, Mushtaq Ahmad and Shazia Sultana and Sultan Bibi**

*Department of Plant Sciences, Quaid-i-Azam University Islamabad Pakistan. 2District Head Quarter Hospital Abbottabad, Pakistan.*

**Abstract:** The present paper deals with 55 plant species belonging to 49 genera and 28 families used as anthelmintic and vermifuge by the tribal and rural people of Northern Pakistan. The district has rich plant biodiversity and people belonging to different ethnic groups and cultures yet have been poorly studied ethnobotanically. Surveys were conducted to identify medicinal plants being used and their uses. Mostly the herbs are used (31 spp) followed by tree (14spp species), shrubs (6spp), climbers (3 spp). Data shows that mostly the plants are used as anthelmintic (36spp.) followed by vermifuge (19spp). The plants being used ethnomedicinally dominate the herbs (31 species) followed by tree (14 spp), shrubs (6 spp), climbers (3 spp). Study shows that a number of medicinal plants including *Thymus serphyllum, Taxus wallichiana, Matricaria chamomilla, Cinnamom camphora, Aristolochis bracteata, Acorus calamus* are threatened due to overexploitation and habitat loss. Attention is required to the management and protection of various ecosystems including in situ and ex situ conservation of species.

Key words: Anthelmintic, medicinal plants, northern, Pakistan.
2.16 Survey of Medicinal Plants From arid Land of Khushab, Punjab, Pakistan

QUreshi, R1, SHAHEEN, H1, MAqSOOD, M1, AKRAM, A1, and GULFRAZ, M2.

1Department of Botany, Pir Mehr Ali Shah Arid Agriculture University, Murree Road, Rawalpindi, Pakistan. 2Department of Biochemistry, Pir Mehr Ali Shah Arid Agriculture University, Murree Road, Rawalpindi, Pakistan.

Abstract: The aim of present study was to record medicinal uses of native plants by the inhabitants of Khushab. For this purpose, the whole area was surveyed during August 2010 to May 2011 and local people including herbalists (Hakeems) and midwives (Daais) were interviewed using a semi-structured questionnaire. The area sustains good proportion of medicinal plants and a total of 87 plant species have been found to use as a source of natural medicine. These species were altogether used to treat about 69 different ailments/diseases. Constipation was found the most prevalent disease in the area and most of the species (20, 6.39%) were used to treat that complaint. It was followed by pimples (16 spp., 5.11%), jaundice (15 spp., 4.79%), boils (14 spp., 4.47%), stomach problem (13 spp., 4.15%), blood purifier (12 spp., 3.83%) and gas trouble (11 spp., 3.51%), liver tonic, skin itching (10 spp., 3.19% each). With reference to conservation status, 68 species were commonly observed in the study area, however 60 species were very commonly seen. All parts of plants were employed for the preparation of medicament with different proportion.

Key words: Khushab, medicinal plants, Pakistan, survey.

2.17 The Use of Folkloric Botanical Extracts as Topical Skin Lightening Agents

Saja Hamed1, Hatim AlKhatib2, Yasser Bustanji2, Fatma Afifi2, and Mohammad Mohammad2

1 Faculty of Allied Health Sciences, Hashemite University, Zarqa, Jordan. 2 Faculty of Pharmacy, University of Jordan, Amman, Jordan.

Abstract: Skin-lightening is a common practice among women living in Jordan that is reinforced by a number of perceived benefits associated with having a lighter skin tone. Main reasons for use were preference of lighter skin tone, the treatment of hyperpigmentary disorders or both. Melanin overproduction characterized a number of skin pigmentary disorders (i.e. melasma, freckles, and postinflammatory hyperpigmentation) which have a significant impact on subject’s psychosocial status since they are common on sun-exposed areas of the face and the neck. Various treatments are available in the market, but none are completely satisfactory due to safety and/or overall effectiveness drawbacks. Thus, identification of new depigmenting agents especially of plant origin is an active research area that is reinforced by the belief that plant extracts have relatively lower side effects than synthetic chemicals. Thus, we attempted to assess our local herbs in Jordan to evaluate their depigmenting effectiveness. The plants prescribed by the local Attar (herbalists) or found in local folkloric medicine books for treating hyperpigmentary problems were purchased and aqueous plant extract was prepared for each powdered plant by extracting 50 gm of powdered plant with distilled water at 60°C for 2 hours. Tyrosinase; the rate-limiting enzyme in melanin production, was targeted during the screening process. The effect of these plant extracts on mushroom tyrosinase activity as well as on B16-F1 melanoma tyrosinase was determined spectrophotometrically using previously published methodology after modifications and validation using known anti-tyrosinase inhibitors (Kojic acid & extract of Glycyrrhiza glabra) which are well known to inhibit mushroom tyrosinase. The majority of the tested plant extracts exhibited well to excellent tyrosinase inhibition efficacy. Of the 24 extracts examined, 13 showed over 50% inhibition of mushroom tyrosinase at a used volume of 120µl. Based on our screening assay, many locally used plants have the potential to be used in ameliorating localized hyperpigmentation problems.

Key words: Botanical extracts, folkloric, skin lightening agents.
2.18 Medicinal Plants as a Source of New Drugs and Natural Products: Use of Traditional Knowledge and Resurrection of Ancient Seeds

Sarah Sallon
Member of the Royal Society of Medicine, London, United Kingdom.

Abstract: Medicinal plants are particularly prevalent in the Middle East with estimates that over a third of local species possess significant medicinal activity. Historically many ancient sources including the Bible, refer to plants for their ceremonial, ritual and medicinal uses while later works including the writings of renowned physicians eg Maimonedes and Avicena, discuss the role of medicinal plants, laying the basis for scholarly and folk medical traditions. Thousands of years of trade and a history of frequent conquest, have also introduced many exotic species originally native to Europe, Asia, Africa and India into the area. Since 1995 The Louis L. Borick Natural Medicine Research Center (NMRC), has assessed as part of its Middle Eastern Medicinal Plant Project (MEMP) the legacy of local medicinal plants and acted as a focus for their conservation and development. The MEMP initiative includes a unique ethno-botanical database with detailed categorization of traditional uses of local medicinal plants, botanical descriptions, commonly used names (in English, Hebrew and Arabic), plant habitat, geographical distribution, ecology, harvesting details, preparation, combinations with other plants and administration. The database also relates traditional use to a modern clinical interpretation, using a standardized symptom list and search engine based on conventional disease classification. Currently the database contains over 500 medicinal species found in Israel with information derived from archival collections, ancient material medicina in Hebrew, Aramaic, Arabic, Greek and Latin and field surveys of traditional healers carried out by NMRC. Since 2000 The MEMP project has cultivated desert medicinal plants at Kibbutz Ketura in southern Israel to preserve biodiversity and provide raw plant material for scientific research without depleting wild source. Separate sites at Noam on the coastal plain and the Jerusalem Botanical Gardens have been initiated to cultivate Mediterranean and mountainous species. Currently over 200 medicinal and economically important species have been domesticated many for the first time. Harvested plants, have contributed to NMRC’s screening programs where species with a long history of traditional use have been successfully tested for activity using an ethno-medical and ethno-botanical approach based on knowledge of their traditional uses. This focused screening has achieved significant success in assessing the bio-activity of selected species for malaria, antibacterial and anti-fungal activity, immune stimulation, anti-viral activity particularly RNA viruses eg Influenza, and neurodegenerative conditions eg Alzheimer's. In addition the use of ancient seeds radiocarbon dated to approx 2000 yrs and retrieved from archeological sites in the Middle East have resulted in the germination by NMRC of date Palm seedlings (Phoenix dactilifera) that have received international interest and may provide important clues to the medicinal and nutritional activities of dates in antiquity.

Key words: Ancient Seeds, drugs, medicinal plants, natural product.

2.19 Ethnobotanical Study of Some Therapeutic Plants Used to Treat Arterial Hypertension in hodna region (Algaria)

SARI Madani, SARRI Djamel, BOUDJELAL Amel and HENDEL Noui
Department of Natural Sciences and Life, Faculty of Science, M'sila University, 28000 M'sila (Algaria)

Abstract: Ethnobotanical investigations were conducted from February 2006 to June 2010 in the region of Hodna to identify the different medicinal plants used in the traditional pharmacopoeia for the treatment of arterial hypertension. Information collected through questionnaires and personal interviews (77 males and 8 female). Thirty-five species belonging to 21 families with a dominance of especially Lamiaecae and Asteraceae were encountered during the study. The modes of herbal drugs preparation were decocion (48%) and infusion (25%). The most frequently used plant parts were the aerial parts (49%).

Key words: Algeria, arterial hypertension, ethnomedicinal survey, Hodna, medicinal plants.
2.20 Ethnobotanical Study of Medicinal Plants in the North East of Setif in Algeria

SERSOUB D., Djirar N., Kaabecho, M., Mihi, A., Zeroug, KH., Sedjar, A. and Bentahar, A.

Abstract: Currently, in certain developing countries as Algeria, traditional medicine often calls upon the use of plants or plants extracts to fight against the various diseases in particular most current. Most of the population still does not have access to conventional medicine, the safeguarding and the promotion of the medicinal plants as well as the traditional knowledge concerning their uses is a health priority. Thus, the interest for the ethnopharmacology can contribute original shares in the continuation of the development of the pharmacopeia of a surveyed region. This discipline shares with ethnobotanical study of the interrelationships between the man and the medicinal plants. It borders and integrates part of the field of the ethnotherapy and implies the cooperation of the ethnology and pharmacology (J.P. Nicolas, 1999). Thus, the ethnobotanical study and the ethnopharmaceutical development in the valley of Boussellam situated in the region of Setif can be summarized in the following phases: Search for ground associating various fields of study and being accompanied by data collection, botanical, phytochemical, and pharmacological study of the selected plants and information feedback on the ground negotiated with the local population. It is also noted that the most plants used by the users in the Valley of Boussellam belongs to the family of Apiaceae as Thapsia garganica and the family of Lamiaceae as Mentha spicata L and Mentha pulegium L. These species contain essential oils which are used especially as carminative, antiseptic, stomachic, and bechic.

Key words: Flora, ethnobotany, biodiversity, medicinal plants.

2.21 Ethnomedicinal Plants Used for Gynecological Diseases in Northern Areas of Pakistan

Shazia Sutlana, Ghulam Mujtaba Shah, Sultan Bibi\textsuperscript{2}, Mushtaq Ahmad and Muhammad Zafar

Department of Plant Sciences, Quaid-i-Azam University Islamabad Pakistan.\textsuperscript{2} District Head Quarter Hospital Abbottabad.

Abstract: The present study was carried out in the Northern Areas of Pakistan to explore medicinal plants to cure gynecological diseases by the tribal people. During the study interviews were carried out in local community, to investigate local people, herbalists and women. The medicinal data on 44 plant species belonging to 22 families and 34 genera was recorded during field trips in study area for curing women ailments. Study provides information on botanical name, family, local name, locality, disease, parts used, recipe and dose. Based on gynecological uses of medicinal plants the study needs further phytochemical screening for drug discovery development of wider acceptance.

Key words: Ethnomedicinal, gynecology, northern Pakistan.
Abstract: Traditional healing is widely practiced in South Africa, however, there has been very little documented research undertaken on the validation of medicinal plant mixtures. This study presents a selection of highlights from our studies on the antimicrobial efficacies of plant combinations. Organic and aqueous extracts were prepared for all plants and their combinations which were then tested against pathogens relative to the traditional use of the plants. Antimicrobial activity was assessed using the minimum inhibitory concentration micro-dilution assay and activity of the combined plants were analysed using the ∑FIC index and isobolograms in order to determine antagonistic, indifferent, additive or synergistic interactions. For toxicity studies, the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide cell viability assay was performed on human kidney epithelial cells. Conventional antimicrobials were tested in combination with commercially relevant indigenous medicinal plants. A study on plants used to treat sexually transmitted infections in Maputaland emphasised the importance of performing tandem toxicity assays. When Sclerocarya birrea and Syzygium cordatum (aqueous extracts) were independently studied, they possessed no toxicity. However, when combined the toxicity levels increased. Conversely, multiple plants in a combination (Euphorbia hypericifolia, Hypoxis hemerocaliida, Senecio serruloides and Ozoroa engleri) demonstrated synergy (∑FIC 0.4). The 1:1 mixtures within this selection displayed antagonism (∑FIC 4.5) against Oligella ureolytica. Agathosma crenulata, Dodonaea viscosa and Eucalyptus globulus, a herbal mix frequently traded informally in Cape Town and used by herbalists descendent from the Khoi-San, demonstrated synergistic interactions as low as ∑FIC 0.05 (Staphylococcus aureus) when used in a multiple combination. Plants with allopathic antimicrobials demonstrated various interactions. Aspalathus linearis, for e.g. demonstrated interactions ranging from synergistic (∑FIC 0.15) to antagonistic (∑FIC 6.03) when combined with ciprofloxacin and gentamicin respectively. Whether interactive efficacies of medicinal plants yield synergistic or even antagonistic efficacies, the importance of combination therapy cannot be ignored and further validations could only enhance the field of phytosynergy.

Key words: Ethnopharmacological, infectious diseases, polyherbals, South Africa.
3.1 The Chemical Investigation of the Algerian *Pallenis Spinosa* and its Medicinal Use

A. DJEBARA¹, F. BITAM, A. DIBI and M. C. ABERKANE

¹Chemical Department, Faculty of Sciences, Batna University, Algeria.

Abstract: Throughout human medical history, people have used medicinal substances extracted from plants to treat diseases and body organs. The Mediterranean species *Pallenis spinosa* (L.) Cass. is one from species of plants were catalogued for use in human medicine. The flowery parts of *Pallenis spinosa* (L.)Cass. is used For the treatment of : Gastralgia, circulatory problems, contusion, injury, inflammation, mouth infections and respiratory problems. There are few studies on this plant as indicated by literature and the main compounds are the germacrane derivatives, sesquiterpenes and flavonoids. In attempt to find other metabolites, a phytochemical study on *P. spinosa* which grows in Algeria was undertaken. The extraction of the aerial parts with different solvents yielded two extracts: chloroform extract and butanol extract. The first analysis in chromatographic showed the presence of sesquiterpenoids and flavonoids compounds. The purification and the structures elucidation of these metabolites have been started. The first analysis spectroscopic resulted in the structure determination of two sterols stigmasterol and β-Sitosterol glucoside. The structures o these two compounds were established by spectral data, including 1D, and 2D NMR. The biological activities of this plant are under study.

Key words: Asteraceae, β-sitosterol glucoside, medicinal plant, metabolites, *Pallenis spinosa*.

3.2 Phenolic contents and antioxidant activity of different parts of *Ficus bengalensis*

Aftab A¹, and Huang Y.W. ²

¹Department of Chemistry and Biochemistry, University of Agriculture Faisalabad, Pakistan. 
²Department of Food Science and Technology, University of Georgia, Athens, Georgia, USA.

Abstract: *Ficus bengalensis* is the member of family Moraceae which is widely used in folk medicines. In this study, phenolic content and antioxidant activity of leaf, fruit and bark of the plant were determined. The methanolic extract was examined for their total phenolic contents (TPC) by using Folin-Ciocalteu reagent and for total flavonoid content (TFC) by using Aluminium Chloride reagent. The antioxidant activity was assessed by using DPPH radical scavenging assay, linoleic acid stabilization and estimation of reducing power of the extracts. Phenolic acids and flavonoid components of the extract were identified and quantified by using HPLC. Results showed that all three parts of the plant have excellent antioxidant activity. The leaves extract have the highest TPC (10.89 g GAE/100 g of dry sample) and TFC (3.89 g CE/100 g of dry sample), followed by the fruit (6.01 g GAE/100 g of dry sample and 2.14 g CE/100 g of dry sample) and the bark (4.11 g GAE/100 g of dry sample and 1.55 g CE/100 g of dry sample). IC₅₀ values of the leaf, fruit and bark extracts were 13.94, 18.62, and 20.4µg/ml, respectively in DPPH radical scavenging assay. Reducing power of the leaf extract was 1.24, while that of fruit and bark extract were 0.919 and 0.797, respectively. Values for percentage inhibition of linoleic acid were 68.95%, 54.42%, and 48.37% for leaves, fruit and bark extracts, respectively. All gallic acid, Protocatechuic acid, Gentisic acid, Chlorogenic acid, Vanillic acid, Caffeic acid and Sinapic acid were identified in all the three samples. However, syringic acid was present in fruit and bark extracts, while p-Coumaric acid was in leaf and bark extracts. Ferulic acid was only present in leaves extract. Rutin, myricetin, quercetin, luteolin and Kaempferol were identified in leaf extract, while all but luteolin was identified in fruit samples. Myricetin and Kaempferol were not found in bark extracts as well. Among the phenolic acids, levels of gentisic acid were 1674 mg /100 g of dry sample in leaf, 610 mg/ 100 gram of dry sample in fruit, and 209.4 mg/100 gram of dry sample in bark extract. Among the flavonoids, levels of myricetin were found the highest in leaf (99.07 mg/ 100 g of dry sample), followed by fruit (20.09 mg/ 100g of dry sample). Rutin, however, was the highest (31.8 mg/ 100 g of dry sample) among the flavonoids identified in the bark extract.

Key words: Antioxidant, ferulic acid, *Ficus bengalensis*, flavonoids, leaf, phenolic, syringic acid.
3.3 Investigation of Secondary Metabolites (Flavonoids) of the Genus Ranunculus
Ahlam Hachelaf, Ahmed Touil, Ammar Zellagui, and Salah Rhouati
Laboratory of Natural Products from plants origins and organic synthesis chemistry, University of Constantine Algeria.

Abstract: Ranunculus L. Gray, a group of something over 20 species of aquatic buttercups with a fluctuating number of sub-specific taxa, is notoriously difficult taxonomically. The species present today may well be the result of secondary speciation resulting from natural selection acting on the products of hybridization. Previous phytochemical studies of the genus Ranunculus revealed the presence of flavonoids alkaloids, triterpene saponins and lactones such as ranunculin and protoanemonin. However, no report of biological or phytochemical investigation on this plant was found apart from a general study regarding its macroscopic and microscopic characteristics. Flavonoids are widely distributed and recognized as taxonomic markers in the genus Ranunculus. The dried aerial parts of R. chinensis were extracted with 95% EtOH. After concentration under reduced pressure, the extract was suspended in H2O and partitioned successively with petroleum ether, AcOH, and BuOH. The BuOH-soluble fraction was separated by repeated chromatographic procedures to give flavonoid glycosides. The Flavonoids were detected on dried papers and plates by examination in ultraviolet light alone and in the presence of ammonia. The extracts were chromatographed one dimensionally on Whatman no. 1 paper in four solvents - butanol:acetic acid: water 4: 1 : 5 (v: v: v) (BAW), n-butanol fraction was separated on a polyamide gel column (Toluene – MeOH), was fractionated on a Sephadex LH-20 column (MeOH-H2O, 1:9 to 1:0), followed by chromatographic CCM, using a mixture of MeOH-H2O as elution system, to give glycosids flavonoids. As mentioned above, there is currently a growing interest in products derived from sour orange, as a result of their increasing commercial diffusion. In this context, the present study demonstrates that the richness and variety of the flavonoid pool of C. aurantium makes sour orange juice an excellent source of healthpromoting compounds with the potential to act as preventing agents for carcinogenesis and cardiovascular diseases.

Key words: Flavonoids, ranunculus, secondary metabolites, sour orange.

3.4 Quality Assurance of Medicinal Plants
Alli Inteaz
Food Science Department, McGill University, Ste. Anne-de-Bellevue, Quebec, Canada.

Abstract: Quality assurance serves to provide confidence that products and services that are offered to consumers meet certain expectations and requirements. Some of the current critical aspects of quality assurance in the cultivation, storage, processing and distribution of plants for food, herbal, and medicinal uses include quality, safety, and traceability activities and practices throughout the supply chain, and management systems-based standardization processes; this is in addition to national regulatory programs and framework for medicinal plants in many countries and internationally recognized guidelines of the World Health Organization. In the case of medicinal plants as a general category of products which are intended for both general and specific uses by consumers, the quality assurance requirements and expectations include regulatory issues, product efficacy, performance, acceptance, stability, labeling and label claims, and adverse effects and product safety. These attributes must be assessed for medicinal plants or herbal medicines since they are can be (a) consumed directly as materials considered as food or beverage or extracted for use in items considered as foods, beverages, food supplements, herbal products, natural health products or (b) used as herbal medicines or drugs or as chemical agents in the preparation or synthesis of drugs, both over-the-counter and prescription drugs. Quality assurance aspects for medicinal plants are addressed at both the international level by WHO guidelines and at national levels by government regulations; however government regulations vary from country to country and all medicinal plants are not subjected to the same national regulations. Generally, quality assurance activities cover the entire supply chain and include good practices throughout the supply chain from cultivation to the point of use by the consumer. In some companies, good manufacturing practices and HACCP systems are used to address food safety requirements of medicinal plants and herbal medicines, primarily during the processing of harvested medicinal plants for conversion into products intended for consumer use. This presentation will cover current perspectives for addressing all aspects for supply chain quality assurance of medicinal plants from cultivation to intended consumer use.

Key words: Assurance, medicinal plant, quality.
3.5 Comparison between Polyphenol Contents and Antioxidant Activities of Different Parts of *Capparis spinosa* L.

ARRAR Lekhmici¹, BENZIDANE Nadia¹, KRACHE Imane¹, , CHAREF Noureddine¹, Seddik KHENNOUF² and BAGHIANI Abderrahmane¹

¹Laboratory of Applied Biochemistry, Faculty of Nature and Life Science, University Ferhat Abbas, Setif, ²Laboratory of Phytotherapy applied to Chronic diseases, Faculty of Nature and Life Science, University Ferhat Abbas, Setif, Algeria.

**Abstract:** *Capparis spinosa* L., Capparidaceae is a shrub growing widely in Algeria. Aqueous and methanolic extracts of five parts were studied for their contents in polyphenols and flavonoids. These extracts were used to evaluate their antioxidant and anti lipid peroxidation effects. Results showed that methanolic extracts contain more total polyphenols and flavonoids than aqueous extracts. Leaves and flowers are rich in either polyphenols or flavonoids while roots are the poor ones. In the same way, all extracts have anti lipid peroxidation and antioxidant effects with a dominance of flowers and leaves especially in the methanolic extracts (82,78 ± 2,64 and 80,94 ±1,57 respectively). Seeds have acceptable effects followed by bud than roots. These results confirm the literature and give a comparative data on the different parts of Capparis spinosa extracts that can be used in the disease with oxidative stress.

**Key words:** Antioxidant, aqueous extract, *Capparis spinosa*, lipid peroxidation, methanolic extract.

3.6 Effect of Polyploïdization and Elicitation on Hyoscyamine Content in Hairy Roots of *Datura*.

Belabbassi Ouarda, Khelifi-Slaoui Majda, Zaoui Djamila and Khelifi Lakhdar

Laboratoire des Ressources Génétiques et Biotechnologie, Ecole National Supérieure Agronomique, 16200 El-Harrach, Alger.

**Abstract:** The hyoscyamine, a secondary metabolite, widely used in medicine, can be produced from roots of *Datura* sp. (Solanaceae). However, its content in the spontaneous roots remains low; hence the use of hairy roots (*in vitro*) to improve it. The production of hyoscyamine through biotechnology is of great interest and has many advantages. The hairy roots (HR) are characterized by a good genetic stability and a rapid growth. Indeed, the HRs of *Datura stramonium* L. are widely studied in the perspective of improving the yield of hyoscyamine. This study is part of this same perspective: it aims to study the effect of polyploidization of HRs induced by colchicine combined or not with an elicitation with the acetylsalicylic (AAS) or salicylic (AS) acids on the HR content in hyoscyamine. Colchicine was applied at different concentrations and periods, on a line (LDS) of *D. stramonium* HR induced by *Agrobactrium rhizogenes* (strain A4). The selection of tetraploid HR lines was made by the cytogenetic analysis using light microscopy and the quantification of their DNA. The selected HR lines are elicited or not by AAS or AS. The effect of polyploidization and elicitation was measured on the biomass dry weight of HRs and their hyoscyamine content. The untreated HR line (LDS: control) with colchicine shows a diploid level with 2n = 2x = 24 chromosomes. However, the HR lines treated with colchicine show, in most cases, an endoreduplication of their genetic material. The survival rate of endoreduplicated lines varies between 30% and 93%, depending on concentration and exposure time to colchicine. Thus, two HR lines (LDS1 and LDS2) were selected after confirming their tetraploid nature. Moreover, the two tetraploid HR lines (LDS1, LDS2) show an increase in their biomass and hyoscyamine content in comparison to the diploid HR Line (LDS). Further elicitation by AAS or AS at the 10⁻⁴ M concentration of the selected HR lines causes respectively a low decrease or increase in dry weight. However, the same treatments show a significant increase in the yield of hyoscyamine in elicited HR lines. Furthermore, the combination of polyploidization and elicitation gives an even more significant improvement in hyoscyamine content.

**Key words:** Colchicine, *Datura stramonium*, elicitation, hairy roots, polyploidization.
3.7 Effects of Growing Region Maturity Stages on Lipid Yield, Fatty Acid Profile and Tocopherols of *Pistacia atlantica* and Its Implications on Resultant Biodiesel

**Ben Ahmed Ziya, Yousfi M., Yvan Vander H., Brahimi A., and Belhadj S.**  
Laboratory of Sciences Fondamentales. University Amar Telidji. Laghouat, (03000), Algeria.  
Laboratory of Analytical Chemistry and Pharmaceutical Technology, Brussels, Belgium.

**Abstract:** The objective of the present study was to monitor total lipid, fatty acid profile (FAP) and tocopherols contents at two stages of ripening, immature and mature *Pistacia atlantica* fruits cultivated south of Algeria (Laghouat and Ain oussera). Saponification number (SN), iodine value (IV), cetane number (CN) of fatty acid methyl esters (FAME) of oils was empirically determined for to predict the quality of FAME for use as biodiesel. The accumulation pattern of lipid yield was strongly influenced by the growing regions and ripens process and showed a remarkable increase at full maturity to reach a maximum of 24.76%, 29.30% in Laghouat and Ain oussera, respectively. In both growing region, the palmitoleic, stearic and linolenic acids proportions correlated inversely with oleic and linoleic acids at two stages of ripening. The tocopherol contents of *Pistacia atlantica* oils were determined by high performance liquid chromatography (HPLC). During the immature stage the amount of total tocopherols (µg/g) in oils of Ain oussera and Laghouat was about 205.8 and 313.49, it decreased to 141.56 and 110.08 respectively in mature stage. FAME of *Pistacia atlantica* oils of immature and mature fruits were found to be most suitable for use as biodiesel by meeting the major specification of biodiesel standards of USA and European Standard Organization. Results of this study indicate that the *Pistacia atlantica* fruits at the immature stage have a healthy nutritional value and the mature stage was with important economic as the feedstock for biodiesel production by biocatalyst.

**Key words:** Biodiesel, fatty acids profile, fruit ripening, lipid content tocopherols, *Pistacia atlantica*.

3.8 Saffron: From Traditional Use to Modern Applications

**Betti, Georges, Schmidt, Mathias**\(^1\) and **Thomsen, Michael**\(^2\)

\(^1\)Medicinal & Aromatic Plants R&D, 2000 Rue des Lucioles, F-06901 Sophia-Antipolis.  
\(^2\)Eusano GmbH & Co. KG, Wartbergweg 15, 86874 Mattsies, Germany.

**Abstract:** Saffron, the stigmas of *Crocus sativus* L., is a traditional medicinal plant and spice material. In the time of IbnSînâ (Avicenna) more than 25 different cultivars of different origins have been described, each with explicit uses. Some are described as having antidepressant effects, others as being used as (sexual) stimulants. The starting point of this study was the question whether these ancient cultivars can still be identified, and whether their uses can be correlated with phytochemical findings. *Crocus sativus* is a sterile species, exclusively multiplied by vegetative propagation starting from the corms. Correspondingly, the gene pool of saffron cultivars does not change by interbreeding. Isolated ancient saffron cultivations stand a chance not to have been altered by imported corms. In the course of our research program we located and screened isolated ancient cultivations of *Crocus sativus* in the countries surrounding the Mediterranean basin – cultivations as yet untouched by the use of mass-production of corms. Saffron quality was assessed based on the methods described in the ISO norm 3632. The phytochemical analysis of saffron from these sources shows distinct differences in the content of safranal and of crocin, especially when the saffron stigmas are obtained under strictly comparable harvesting and processing conditions to exclude external modifiers of saffron quality. Modern pharmacology and clinical research attributes antidepressant effects to the marker substance safranal, and stimulant effects to crocin. This association is well-correlated with the traditional recommendations of IbnSînâ. The content of the specific marker substances can be further increased by the application of well-defined harvesting and processing protocols – methods also adopted from ancient sources and optimized to cultivation protocols. The retrospective confirmation of ancient knowledge has practical implications: It may be used for the selection of optimal cultivars for specific uses (e.g., use as an aphrodisiac or as an antidepressant). The application of adequate cultivation, harvesting and processing protocols has an immediate impact on saffron quality, and thus on the economic result of saffron cultivation due to the classification of the harvest in better quality classes.
according to ISO 3632. The knowledge of phytochemical properties of saffron can also be used during manufacturing of pharma-grade saffron extracts to steer the process towards a further increase in marker compounds. These improvements of saffron extract quality and standardisation allow a reproducibility of phytochemical properties, which is important for the reliability and reproducibility of clinical effects.

**Key words:** Modern applications, traditional use, saffron.

### 3.9 Neolignans from the Marine Phanerogams *Posidonia oceanica*

**Bitam Fatma**¹, Ciavatta, Maria Letizia² Manzo, Emilianno²; Villani, Guido² and Gavagnin, Margherita².

¹Faculté des sciences, département de Chimie, Université de Batna, Batna 05000, Algeria. ²Istituto di Chimica Biomolecolare, C.N.R., Via Campi Flegrei 34, I-80078 Pozzuoli, Naples, Italy.

**Abstract:** Sea-grasses are the marine flowering plants that successfully grow in tidal and subtidal marine environment. They are an ecologically important role for structuring a number of ecosystems, stabilizing coastlines, providing food and shelter for diverse marine organisms and act as a nursery ground for many fishes of commercial importance. *Posidonia oceanica* is one of these groups of plants which played this role in the Mediterranean basin. A number of phytochemical investigations with different focus were carried out. The main compounds included sterols and phenolic compounds such as: phenylmethane derivatives, phenylethane derivatives, phenylpropane derivatives and their esters, chalcones, flavonols, 5α-cholestanes, and cholest-5-enes. Some limited studied proved the presence of lignins in some seagrasses such as *Posidonia oceanica* and *zostera marina*, but no mention on their lignan composition. Here, we report the first chemical investigation of lignans of *Posidonia oceanica*. The roots were extracted with acetone; the obtained extract was partitioned with chloroform and n-butanol giving two fractions. The chloroform fraction was purified using different chromatographic methods, in particular the HPLC technique. The spectroscopic experiences mainly the $^1$H and $^{13}$C NMR techniques, the IR and mass spectrometry allowed us to identify the structures of three new neolignans (A, B and C) containing a dihydrobenzo[b]furan skeleton. However, the relative stereochemistry of the C7-C8 ring was established to be trans by the NOE difference experiment while the absolute stereochemistry is under study.

**Key words:** Chloroform fraction, lignin, Neolignans, *Posidonia oceanica*, sea grasses.

### 3.10 Analysis of Volatile Products in Honey by SPME – GC-MS

**Boudina Ali,** Benmssedak Malak, and Yassaa, Noureddine

USTHB, University of Sciences and Technology Houari Boumediene, Faculty of Chemistry, B.P. 32 El-Alia, Bab-Ezzouar, 16111 Algiers, Algeria.

**Abstract:** Pesticides play a beneficial role in agriculture, because they help to combat the variety of pest that destroy crops, even though small amounts of pesticide residues remain in the food supply, constituting a potential risk for the human health, because of their sub-acute and chronic toxicity. Honey samples collected from different Algerian locations have been analysed by means of Solid Phase MicroExtraction (SPME) and gas chromatography/mass spectrometry in order to investigate the eventual presence of pesticide residues. The use of solid SPME fibre namely 75 µm Carbowax/DVB allowed a number of honey-related compounds to be identified along with several contaminated products. The application of this technique in the analysis of pesticide residues in honey will be discussed with regards to the simplicity, the solventless and rapidity of the SPME technique.

**Key words:** Gas chromatography, honey, micro extraction, pesticide residues, solid-phase.
3.11 Analysis of Crude and Chromatographic Fractions of *Eucalyptus globulus* Leaves

**Boulekbache-Makhlouf Lila, Slimani Sakina, and Khodir Madani**
*Faculty of Nature and Life Sciences, 3BS Laboratory, University of Bejaia 06000, Bejaia, Algeria.*

**Abstract:** Leaves of *E. globulus* were taken from 25-year-old trees (ten trees) randomly harvested from the arboretum of Derguinah; Bejaia in the north east of Algeria (36°31'13.56"N, 5°17'18.43 E). The leaf samples were dried in an oven at 40°C, and ground to obtain a thin powder (250 µm of diameter). 1g was extracted with 100 mL of aqueous acetone (70%) containing 0.5% acetic acid to prevent oxidation. The extract was filtered (Whatman paper no. 4) and the acetone was evaporated under reduced pressure in rotary evaporation at 40° C. The remaining aqueous phase was treated with hexane (25 mL x 3) to remove lipids, concentrated under reduced pressure, and lyophilized. Acetonic extract was then fractionated by chromatography on a Sephadex LH-20 column using consecutive elution with ethanol, methanol and aqueous acetone (60%). The total phenolic concentration was determined using Folin-Ciocalteu reagent, flavonoids content was evaluated by using 2% aluminium chloride method and tannin contents was measured by protein precipitation method. The antioxidant activity of different extracts was performed by using three methods: ferric reducing power, DPPH• radical scavenging activity and scavenging of hydrogen peroxide (H₂O₂). Fractionation of acetonic extract yielded three fractions: FA, FB and FC. The total phenolic concentrations of different extracts varied from 53.79 to 432.63 mg/g dry weight, expressed as gallic acid equivalents (GAE). Flavonoids were detected only in crude extract and their amount is about 3.65 mg quercetin equivalents (QE)/g dry weight. Tannin contents varied from 27.54 to 105.39 mg/g dry weight, expressed as tannic acid equivalents (TAE). Fraction C and B extracts exhibited high reducing power (CR₀.₅ 33.41 µg/ml and 43.17 µg/ml, respectively) than crude extract (43.1 µg/ml). It was observed that fraction B and C extracts displayed the highest DPPH• scavenging ability (C₅₀ 87.77 and 87.12 µg/ml, respectively) followed by crude extract (C₅₀ 114.25 µg/ml). These two fractions displayed also the highest ability to neutralize hydrogen peroxide (53.58% and 43.20%, respectively). The results showed that fractions B and fraction C exhibited considerably higher antioxidant activities for the three antioxidant tests comparatively to that of crude extract and α-tocopherol. Fraction A exhibited the lowest antioxidant.

**Key words:** Antioxidant test, chromatography, *Eucalyptus globulus*, leaves, tannin.

---

3.12 Phytochemical Study and Antioxidant Activities of Leaves Extracts from *Rhamnus alaternus*

**Boussahel Soulef¹, Dahamma S.,¹ Giuseppe R.,² Siracusa L.², Harzallah D.³**
¹Laboratory of Phytotherapy Applied to Chronic Diseases, Department of ecology and vegetal biology, Faculty of Natural and Life Sciences, University Ferhat Abbes, Setif 19000 Algeria,
²Institute of biomolecular chemistry - C.N.R., Via Paolo Gaifami, 18 95126 Catania, Italy.
³Laboratory of Applied Microbiology, Department of Microbiology, Faculty of Natural and Life Sciences, University Ferhat Abbes, Setif 19000 Algeria.

**Abstract:** This study was designed to examine the chemical composition and in vitro antioxidant activities of leaves extracts from *Rhamnus alaternus* L.; we submitted two extracts (methanolic and aqueous) of different polarity to a deep compositional analysis through the use of an advanced hyphenated technique like LC/Uv-vis-DAD/MS. to our knowledge no metabolic fingerprint studies have been done on this species so far. So, we report for the fist time the complete secondary metabolic fingerprint of *R. alaternus* polar extract, the chromatographic pattern from aqueous extract has several similarities with the methanolic one; we note the presence of Flavones (quercetin, kaempferol and rhamnetin derivatives). The samples were also subjected to a screening for their possible antioxidant activities by using 2,2-diphenyl-1-pircylhydrazyl (DPPH) and β-carotene-linoleic acid assays, in the first case the IC₅₀ value was of 0.082±0.0006 mg/ml for the methanolic extract and 0.398±0.0074 mg/ml for the aqueous one, in the β-carotene-linoleic acid system, the inhibition values of linoleic acid oxidation were estimated.
as 89,007±1,914 % and 59,639±3,824 % for the methanolic and aqueous extract respectively. In both tests the methanolic extract was the most active. On the other hand, total phenolics determination in the test solutions was carried out according to the spectrophotometric Prussian blue assay and the determination of flavonoids was performed using the method of aluminum trichloride, (AlCl₃) all the results indicated that the methanolic extract has higher total phenolics and flavonoids being of: 33.655±2.503mgGAE/g; 129.681±1.546 mg ER/g, for the second one. According to all these results, we conclude that there is a clear relationship between chemical composition of R. alaternus and its antioxidant activities.

**Key words:** Antioxidant activities, chemical composition, extracts Rhamnus alaternus L.

### 3.13 Optimisation of Solvent Extraction of Antioxidant Compounds (Phenolic Compounds) from Algerian Mint (Mentha spicata L.)

**Brahmi Fatiha¹**, Madani Khodir¹, Rahmani Tiziri, Bousbaa Karima, Oukmanou Sonia¹ and Chibane Mohamed ¹

¹Laboratoire de Biomathématique, Biochimie, Biophysique et Scientométrie, Faculté des Sciences de la Nature et de la Vie, Université Abderrahmane Mira, Bejaia, Algérie.

**Abstract:** The mints are herbs rich in essential oils and phenolic compounds that appear to be the cause of prevention of many diseases. This study first allowed to quantify the levels of polyphenols and flavonoids from mint: Mentha spicata L. harvested in Bejaia (Algeria) using pure solvents (methanol, ethanol, acetone) and their aqueous mixtures at 50%; and secondly, to evaluate their antioxidant activities by two methods (radical scavenging activity using DPPH and total antioxidant activity by phosphomolybdate test). The protocol elaborated by Singleton and Rossi (1965) was used to quantify total phenolics. Flavonoids were evaluated using Bahorun et al. (1996) protocol. The method ported by Stankevičius and al. (2010) was adopted to determine radical scavenging activity of different extracts while this ported by Jayaprakasha et Patil (2007) to determine total antioxidant activity. In light of our results, it appears that ethanol 50% gave a better extraction rate for the plant studied (14.1%). On the other hand, the ethanol extract of 50% presented the highest content in polyphenols (39.473 ± 1.81 mg EAG / g DM). Consequently, it manifests the highest radical scavenging activity. Regarding flavonoids, methanol was the best extractor. Whereas, the total antioxidant activity was attributed to the acetic (0.230 ± 0.015 AU) and ethanolic extracts (0.222 ± 0.016 AU) without significant difference. The difference in the antioxidant capacity of different extracts was probably due to the difference of the nature of the compounds extracted with different solvents.

**Key words:** Antioxidant activity, extraction, Mentha spicata, phenolic.

### 3.14 Morphological and Biochemical Characteristics of Pollen Grains and Bee Corbicular Pollen Collected from Sunflower (Helianthus annuus L.)

**Brindza Jan¹**, Synytsya Andriy², Bíro Daniel¹, Ostrovsky Radovan¹, Shevtsova Tetiana³, and Toth Dezider¹

¹Institute of Biodiversity Conservation and Biosafety, Faculty of Agrobiology and Food Resources, Slovak University of Agriculture (SUA) in Nitra, Slovak Republic;²Department of Carbohydrates and Cereals, Institute of Chemical technology (ICT) Prague, Czech Republic, National Aviation University, Institute of Ecological Safety, Kiev, Ukraine³
Abstract: Determination of morphological and biochemical traits of pollen grains and bee corbicular pollen gained from the sunflower (*Heliathus annuus* L.). On 6 operated stands with 16 sunflower hybrids in several localities of Slovakia were gained both, the pollen grains collected mechanically and the bee corbicular pollen accumulated on the pollen rakes. Pollen samples were analyzed by spectrophotometric methods at the ICT Prague and the biologically active components determined by the HPLC on the Faculty of Pharmacy in Coimbra, Portugal. The length of polar and equatorial axes of pollen grains was evaluated on electron scanning microscope. The medium length of pollen grains polar axis ranged from 45.03 to 46.55 µm and that of equatorial axis from 38.01 to 40.66 µm. Evaluation of 6 hybrids resulted in a medium value of pollen production by one group in a range of 37.8 – 151.9 mg. Based on 6 bee pollen samples was determined the medium values for weight of pollen in one corbicula (7.57 – 10.70 mg), height (2.84 – 3.38 mm) and width (3.21 – 3.72 mm). There were observed significant differences among the hybrids in all evaluated traits. The reflectance Vis spectrophotometry confirmed that the flower pollen colour owing to collection by the bees is changed. Spectrophotometry showed, that the sunflower pollen contains high amount of carotenoids and the HPLC indicated the presence of different quercetine, gallic and chlorogenic acids derivatives and other non-identified components as well. The beekeepers of Slovakia are prepared to collect every year more than 5,000 kg of bee corbicular pollen of sunflower fields, i.e. the product, which is suitable for further processing in the pharmaceutical and several other branches as well.

Key words: Bee pollen carotenoids, *Helianthus annuus* L, phenolic acids, pollen, sunflower.

3.15 Source of Isoflavone Concentrations Variation in Perennial Clover Species

**Butkuté Bronislava**¹, Dabkevičienė Giedrė¹, Lemežienė Nijolė¹, and Jakštas Valdas²

¹Institute of Agriculture, Lithuanian Research Centre for Agriculture and Forestry
LT-58344 Akademija, Kėdainiai distr., Lithuania.
²Department of Pharmacognosy of Lithuanian University of Health Sciences. A. Mickevičiaus str. 9, LT-44307 Kaunas, Lithuania

Abstract: Traditionally, clover is used as a highly valuable livestock forage. Clover has attracted considerable interest as an important source of isoflavones – phytoestrogenic compounds. The current study aimed to determine the individual and total concentration of three isoflavones in clover species grown under a cool temperate climate environment in Lithuania and to assess the variation of these compounds’ concentration among and within clover species. Isoflavone contents were quantified in the plant parts of 5 perennial species of genus *Trifolium* (*T. pratense*, *T. repens*, *T. medium*, *T. rubens* and *T. pannonicum*) and a total of 21 entries were examined. Daidzein, formononetin and genistein concentrations were quantified in separate plant parts by reversed-phase high-performance liquid chromatography (RP-HPLC). Fresh samples of leaves, stems, flowers and roots were fixed at 105°C, dried at (65 ± 5)°C and ground in a cyclonic mill with a 1 mm sieve. The analyte extraction procedure included acid hydrolysis of glycoside forms and was performed under the conditions described in the USP monograph. According to the averaged sum of the three isoflavones quantified in leaves-stems-flowers, the 5 clover species ranked as follows: *T. medium* (7.54-3.62-2.31 mg g⁻¹) > *T. pratense* (2.74-3.32-2.22 mg g⁻¹) > *T. rubens* (0.493-0.780-0.380) > *T. pannonicum* (0.274-0.230-0.980) > *T. repens* (0.191-0.204-0.171 mg g⁻¹). The contribution of individual compound to total isoflavone content depended on the species, accession and plant part. The major part of the isoflavones is concentrated in leaves or stems; however there is a great variation also. The study of two Lithuanian varieties of *T. pratense* for distribution of isoflavones in roots and aerial plant parts showed difference between varieties: Vyčiai was characterized by apparently largest isoflavone concentration in roots (4.73 mg g⁻¹) and by the lowest in leaves (2.18 mg g⁻¹), while stems of Vyliai had the highest (4.74 mg g⁻¹) and flowers the least (1.82 mg g⁻¹) amount of phytoestrogenic compounds tested. The main conclusion to be drawn from this study is that there exists a large variation in the total as well as in individual concentration of isoflavones among the clover species and plant parts and within species. With
regard to isoflavone concentration and it variability within the clover species, some accessions of *T. medium* and *T. pratense* can be considered a highly promising source of phytoestrogens.

**Key words:** Concentration, isoflavone, perennial clover, variation.

### 3.16 Essential Oils and Morphological Study of *Mentha aquatica*

**Chaker, A. N., Boukhebti, H., Sahraoui, R. and Ramdhani, M.**  
Laboratoire de Valorisation des Ressources Biologiques Naturelles (VRBN), Département Biologie et Ecologie végétale, UFA, Sétif, Algérie.

**Abstract:** As part of the development of plant resources, we are interested in the chemical study of essential oils of *Mentha aquatica* that is widely used in Algerian traditional medicine. Essential oils extracted from this plant obtained by hydrodistillation with a Clevenger type apparatus for a period of three hours. The extraction produces yellowish essential oils with a very strong odor. Chemical analysis of the essential oils is achieved by gas chromatography coupled with mass spectrometry (GC / MS). The major compound in essential oil of *M. aquatica* is linalyl Acetate (26.109%) and other constituents such as α-Pinene (22.708%), Linalool (13.755%), in addition morphological studies witch is realized manually show tow different types of glandular trichomes on leaves and stems and lacunar parenchyma in stem section.

**Key words:** Chemical analysis, essential oils, *M. aquatica*, morphological study.

### 3.17 Assessment of Bioactive Molecules Content in Some Marketed in Algeria

**CHIKHOUNE Anis**, **LOUAILECHE H.**, **SOUFI W.** and **KHELADI B.**  
1Department of Food Sciences, Nature and Life Sciences Faculty, A/Mira University, Bejaia.  
2Department of Food Technologies, Institute of Food, Feeding and Food Agric Technologies, Mentouri University, Constantine, Algeria.

**Abstract:** Spices lavish several phytochemical molecules to diet and play consequently a significant role in the prevention of chronic diseases. The aim of our work is to proportion these molecules also said antioxidants in three spices: black pepper, cinnamon and ginger in the two forms: whole spices and powders. Samples: black pepper, cinnamon and ginger in the two quoted marketed forms. Solvents of extraction: Boiling water, ethanol 50%, ethanol 70%, hexane. UV-Visible spectrophotometer was used for the proportioning of the following antioxidants: carotenoids, phenolic compounds, flavonoids, anthocyanins and proanthocyanidins. Procedure: three extractions were carried out: the first one to extract carotenoids, the second one to extract the total phenolic compounds, the flavonoids, the proanthocyanidins and the third one to extract the anthocyanins. Variations of antioxidants contents were raised according to spice and type of solvent. According to the results of proportioning obtained, cinnamon (whole spice and powder) showed remarkable contents for the majority of antioxidants: example of the phenolic compounds: whole spice: 4.40±0.43g/100g, powder spice: 6.82±0.98g/100g for boiling water, 1.49±0.03g/100g and 29.19±1.30g/100g for the ethanol 50%, 9.94±0.39g/100g and 38.47±0.49g/100g for the ethanol 70%, except the anthocyanins where no content is revealed and carotenoids where the values are of 0.15±0.06g/100g and 3.05±0.09g/100g respectively for whole spice and powder. The results of the antioxidant activity (reducing power) confirmed it richness compared to ginger and black pepper. It is highly advised to incorporate these spices in the dishes to profit from the benefits which they can bring, while respecting the amounts to be introduced.

**Key words:** Antioxidant activity, antioxidants, solvents, spices.
3.18 Bioactive Isoquinoline Alkaloids from Carduus crispus Plant and their Synthesis

F. Louafi¹, J. P. Hurvois², S. Shahane², J. Moreau², and A. Chibani¹
¹Département de Chimie, Université Mentouri de Constantine, Route Ain El Bey, Constantine 25000. ²Sciences Chimiques de Rennes, Université de Rennes 1, Campus de Beaulieu, 35042 Rennes Cedex, France.

Abstract: The plant Carduus crispus Linn (welted thistle) has been used in Chinese folk medicine for the treatment of cold, stomach pain and rheumatism. An extract of the plant showed significant cytotoxic activity against SKKOV3, KB, and HeLa human cancer cell lines. Phytochemical studies by Zhao group led to the isolation of two pyrrolo-[2,1-a] isoquinoline alkaloids Crispine A and Crispine B as well as bicyclic isoquinoline alkaloids Crispine C and D. A biological activity evaluation of each of the alkaloids showed Crispine B to be responsible for cytotoxic property. Following this information, numerous groups have synthesized Crispine A and its analogues in both racemic and enantiomerically pure forms. A new and reliable route to Carduus Crispus L. alkaloids from tetrahydroquinoline has been developed in this work. The α-CH bond of the tetrahydroquinoline nucleus was activated to produce an α-amino nitrile 1 as a key step to obtain the anti-tumor active pyrrolo-[2,1-a] isoquinoline alkaloids (3)-crispine A and its antipode.

Key words: Alkaloids, anti-tumor, Carduus Crispus, synthesis.

3.19 Chemical composition of leaf Essential Oils and Antioxidant Activity of Methanol Extracts of Juniperus phoenicea

Foudil-Cherif Yazid, Boutarene Naoual, and Mansour Amira
USTHB, University of Sciences and Technology Houari Boumediene, Faculty of Chemistry, B.P. 32 El-Alia, Bab-Ezzouar, 16111 Algiers, Algeria.

Abstract: The chemical composition of essential oil extracted by steam distillation from leaves of Juniperus phoenicea growing in Algeria has been determined by capillary gas chromatography using flame ionization and mass spectrometric detection. The compounds were identified according to their retention indices and mass spectra. The main compounds were α-pinene (30.53%), p-cymene (22.98%), α-terpineol (8.29%), β-pinene (4.69%), linalool (3.78%) and piperitone (2.88%). The obtained results showed differences in composition with respect to previous studies of leaf oils of J. phoenicea (Greece, Spain and Morocco). Antioxidant activities of the essential oil and the methanolic extract from leaves were evaluated by using DPPH radical scavenging. In all the performed tests, methanolic extracts showed better antioxidant activity than essential oils. In addition the total phenol contents of leaves were estimated and compared.

Key words: Antioxidant activity, composition, essential oils, Juniperus phoenicea, phenolics.

3.20 Ascorbic Acid Content Changes in the Leaves of Selected Species of Diospyros spp. Genus during their Growth

Grygorieva Olga¹, Vergun Elena¹, Brindza Jan², Rakhmetov Dzhamal¹, and Stehlikova Beata³
¹M. M. Grishko National Botanical Garden of Ukraine National Academy of Sciences, Kiev, Ukraine. ²Institute of Biodiversity Conservation and Biosafety, Slovak University of Agriculture, Nitra, Slovak Republic. ³Pan European University, Bratislava.

Abstract: Changes in the accumulation scale of ascorbic acid in the leaves and one-year old offshoots of Diospyros spp. during a 6-month period (May - October). In the experimental
evaluation were included 4 species of *D. kaki* L.f., *D. virginiana* L. (male - m and female - f genotypes), *D. lotus* L. (male – m and female - f genotypes), and an interspecies hybrid *D. virginiana* L. × *D. kaki* L.f. All tested plants were grown in the Botanical Garden of M. M. Grishko of the National Academy of Sciences in Kiev, Ukraine. In the withdrawn leaves and defoliated one-year-old offshoots were determined the ascorbic acid content and their dry-weight in one-month intervals. With leaves were controlled their length and width as well. Medium length of the leaf blade ranged from 120.19 (D. virginiana L.- m) up to 190.94 mm (D. virginiana L.) and the width from 50.17 mm (D. virginiana L.- m) to 100.12 mm (D. virginiana L. x D. kaki L.f). Using the method of time-interval the ascorbic acid medium increment coefficient in the leaves has been detected in ranges from -0.19 (D. virginiana L.) up to -0.41 (D. kaki L.f.) and in the case of offshoots from -0.34 (D. virginiana L.) to -0.54 (D. virginiana L.-m). Leaves medium growth rate varied between 58.87 (D. kaki L.f.) and 45.44 for offshoots 45.44 (D. virginiana L.) and 65.19 % (D. virginiana L.). Among the tested species, significant differences were found in the antioxidation activity as well. Leaves and offshoots are important products, which could be utilized as resources of biologically active substances for pharmaceutical products.

**Key words:** Ascorbic acid, diospyros, virginiana L, lotus L, leaves.

### 3.21 Secondary Metabolites from Algerian Plant *Atractylis flava*

**Haba Hamada¹**, **Chabani S¹**, **Lavaud C²**, **Harakat D²**, and **Benkhaled M.¹**

¹Department of Chemistry, Faculty of Science, Batna University, 05000, Batna, Algeria. ²Institut de Chimie Moléculaire de Reims, CNRS UMR 6229, BP 1039, 51097 Reims Cedex 2, France

**Abstract:** The plant *Atractylis flava* Desf. belongs to the family Asteraceae. This family is one of the most important botanical families of plants kingdom. It contains a large number of species so different by their vegetative appearance, approximately 25000 species, distributed in temperate zones of the globe, Northern Africa (Algeria, Morocco and Tunisia) and in Southern Europe (Italy, Greece, Spain and Portugal). The genus *Atractylis* is chemically little investigated. As such the studies have been realized on the toxic species *Atractylis gummitera*, its toxicity was attributed to actryloside and carboxytractylactoside, two diterpenoid glucosides capable of inhibiting mitochondrial oxidative phosphorylation. Triterpenoids and flavonoids were isolated previously from this genus. *Atractylis flava* Desf. (syn. *Atractylis carduus* (Forsk.) Christ.) known as yellow thistle, is a perennial plant growing in the Saharan region. *Atractylis* plants have been used in folk medicine to treat circulatory disorders, intestinal parasites, ulcers, and snake-bite poisoning. The present work describes the isolation by chromatographic methods of eight secondary metabolites from ethyl acetate extract of *A. flava*; three flavonoids: chrysin, quercetin 5,7,4'-tri hydroxy-3'-methoxy-3-O-a-L-rhamnopyranosyl-(1-6)-β-D-galactopyranosylflavonol; three triterpenes: oleonolic acid, hedragenin acid and 3β,22β-dihydroxyolean-12-en-28-oic acid and two steroids: β-sitosterol glucoside and stigmasteral glucoside. Their structures were determined by spectroscopic analysis including 1D and 2D NMR (*¹H, ¹³C, COSY, TOCSY, HSQC, HMBC, NOESY*) and mass spectrometry (ESI-MS) and comparison with literature data. In the biological part, crude extracts (dichloromethane, ethyl acetate and n-butanol) of A. flava exhibit antibacterial activity against Gram positive and negative strains: *Staphylococcus aureus* ATCC23, *Staphylococcus aureus* ATCC582, *Pseudomonas aeruginosa* ATCC 374 and *Pseudomonas aeruginosa* ATCC 53. The anti-oxidant activity was estimated on the extracts by the DPPH test.

**Key words:** Algerian plant, *Atractylis flava*, flavonoids, secondary metabolites, species.

### 3.22 A flavone glucoside from the roots of *Salvadora persica* (Rutaceae)

**Hassan Abdalla Almahy**

Chemistry Department, Faculty of Science and Education, Taif University, Kingdom of Saudi Arabia

**Abstract:** A flavone glucoside, luteolin 8-C-β-D-glucopyranoside was isolated from the ethyl acetate extract of the roots of *Salvadora persica* and separated using column chromatography techniques. The structure of the compound was established by UV, IR, *¹H-NMR, ¹³C-NMR, COSY,
HMOC, HMBC, DEPT and MS studies. The compound has never been reported previously from this plant.

**Key words:** Flavone glucoside, rutaceae, *Salvadora persica*, spectroscopic data.

### 3.23 Chemical Constituents of *Cachrys libanotis* L.

*Kamel Medjroubi¹, Nabila Bouderdra¹, Abdelhakim Elomri², Philippe Vérite³, and Elisabeth Seguin²*

¹Laboratoire de Phytochimie et Analyses Physico-chimiques et Biologique, Département de Chimie, Faculté des Sciences Exactes, Université Mentouri de Constantine, Route d’Aïn El Bey 25000 Constantine Algérie.²Université de Rouen, CNRS UMR 6014,C.O.B.R.A. - I.R.C.O.F., UFR Médecine-Pharmacie, 22 Boulevard Gambetta, 76183 Rouen cedex 1, France. ³Université de Rouen, ADEN EA 4311, UFR Médecine-Pharmacie, Laboratoire de Chimie Analytique, 22 Boulevard Gambetta, 76183 Rouen cedex 1, France.

**Abstract:** Seven known coumarins and flavonoid glycoside, osthole, Meranzin hydrate, 8-methoxy marmesin, 3”-methoxy dihydroseseletin, nodakenin, 8-hydroxy nodakenin, Meranzin hydrate-3”-O- álglucopyranoside, hesperidin, were isolated from aerial parts of *Cachrys libanotis*. Their structures were determined by 1 and 2-D NMR techniques.

**Key words:** *Apiaceae, Cachrys libanotis*, coumarins, flavonoid glycoside.

### 3.24 Determination of Flavonoids and Tannins in some Serpentine *Hypericum* Populations from Bulgaria

**Krasteva Ilina¹, Pavlova Dolja², Pencheva Ivanka³, Nedelcheva Anely², Zdraveva Petranka¹, and Nikolov Stefan¹**

¹Department of Pharmacognosy, Faculty of Pharmacy, Medical University, ²Department of Botany, Faculty of Biology, University of Sofia., ³Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University, Sofia, Bulgaria.

**Abstract:** Serpentine habitats are naturally rich in potentially cytotoxic elements like Ni, Fe, Mg, Co which exert strong selective pressures on the native vegetation. The most species growing on serpentine are adapted to these special conditions in different ways. In this study we investigate 7 populations of three *Hypericum* species (*H. cerastoides*, *H. aucheri* and *H. montbretii*) growing on serpentines in Bulgaria to evaluate: 1) tannins and flavonoids content in the aboveground plant parts; 2) differences between species and their populations growing on and off serpentine. Aerial parts of *Hypericum* species were collected during the flowering season in June 2010 from serpentine, distributed in Rhodope Mts. The total quantity of the tannins and flavonoids are determined by spectroscopic method (European Pharmacopoeia). The presence of rutin in the samples was established by HPLC analysis. The results of the quantitative analysis of flavonoids and tannins in serpentine populations were compared with literature data for non-serpentine populations. Total amount of flavonoids in the serpentinite samples varies from 0.82% to 1.54% and in non-serpentine – 0.74–1.22%. The results show that the content of flavonoids in serpentine populations was higher than non-serpentine. In the most of the studied serpentinite samples were found higher levels of tannins than non-serpentine. Only in *H. cerastoides* the content of tannins is lower than non-serpentine. HPLC analysis detected the presence of rutin in the serpentinite populations from *H. montbretii* and *H. cerastoides*. In populations of *H. aucheri* the content of rutin is in trace. The high amount of rutin was found in populations of *H. cerastoides*. In populations of *H. montbretii* the content of rutin is lower than in *H. cerastoides*. The study is still in progress. Comparisons between rutin content in serpentine and non-serpentine populations are impending. The serpentine populations show constantly high levels of flavonoids and tannins than
non-serpentine, except of content of tannins in samples from *H. cerastoides*. It could be suggested that these levels are in relation with the specific stress conditions of the habitat.

**Key words:** flavonoids, flowering season, habitat, *Hypericum*, Serpentine, tannins.

### 3.25 Analysis of Extracts of Different Polarity from Yarrow Herb

**Kyslychenko O., Koshoviy O., and Komissarenko A.**

*The National University of Pharmacy, Kharkiv, Ukraine.*

**Abstract:** Yarrow herb (*Achillea millefolium*) is widely used in official medicine as hemostatic, antimicrobial and anti-inflammatory remedy. There are approximately 20 drugs at the market of Ukraine and Russia Federation that contain biologically active substances (BAS) of yarrow herb. Nevertheless, there is no mono-drug on yarrow basis that may be some kind of omission as this raw material has a broad spectrum of pharmacological activity and can become a basis for the new antimicrobial and anti-inflammatory remedies. While making the literature review we found out that extraction parameters of this plant material are not justified in a proper way. That is why the aim of our research was to find the extractant that provides the best extraction of BAS from yarrow herb and to study the chemical content of these BAS and their antimicrobial activity. Solvents with different dielectrical constants such as ethanol, water, ethylacetate, hexane, chloroform, and acetone (1:10) were used to obtain extracts from yarrow herb. 1% ethanol solutions were prepared from obtained extracts and were further used for the analysis. Qualitative reactions, paper chromatography and TLC were used to study the qualitative composition. Hydroxycinnamic acid derivatives, flavonoids, tannins, coumarins, terpenoids and chlorophylls were detected in yarrow herb extracts. The quantitative content of main BAS groups was determined. Quantitative determination of phenolic compounds (hydroxycinnamic acid derivatives, flavonoids, and chlorophylls) was made by spectrophotometry according to the wavelength. Hydroxycinnamic acid derivatives were determined in terms of chlorogenic acid (λ=327 nm) after formation of complex with Aluminium chloride, the total phenolic compound content in terms of gallic acid (λ=270 nm) and chlorophylls (λ=649, λ=665 nm). The essential oil content was performed according to the State Pharmacopoeia of Ukraine by the hydrodistillation technique in presence of water vapors. It was found out that ethanol in concentration from 70% to 96% as well as ethylacetate provided the best extraction of BAS. Studies of antibacterial activity were conducted by diffusion to agar technique. Yarrow herb extracts show antimicrobial activity to *S. aureus*, *B. subtilis*, *S. pyogenosa* and *E. coli* but has a very light impact on *Proteus vulgaris*, *P. aeruginosa*, *Candida albicans*. Ethanol and ethylacetate extracts were the most active. To make a conclusion, chemical content and antimicrobial activity of ethanol, water, ethylacetate, hexane, chloroform, and acetone extracts from *Achillea millefolium* herb were studied. That will be a basis for new drugs development.

**Key words:** Antimicrobial, essential oil, gallic acid, phenolic, Yarrow herb.

### 3.26 Flavonoids of Some Salvia Species wide-Spread in Ukraine

**Kyslychenko, Viktoria., Koshoviy, Oleg., and Komissarenko, Andriy**

*The National University of Pharmacy, Kharkiv, Ukraine.*

**Abstract:** *Salvia* genus consists of about 600 species, 30 of them are found in Ukraine. Official raw material in Ukraine is *folia S. officinalis*. *S.officinalis* is native to Asia and in Ukraine it’s cultivated. Main therapeutic activities of the drugs, containing its extracts are antibacterial and anti-inflammatory. *S.officinalis* leaves are used in pharmaceutical industry as the source of essential oil as well as are needed for tincture production, acetone extract “Salvin”. *S.sclarea* essential oil which possesses broad spectrum of antibacterial activity is also used. The analysis of literature has shown that isoprenoids such as mono- and sesquiterpenoids, phenilpropanoids, di- and triterpenes, fatty acids were studied the best. There is an expediency of phenolic substances study,
particularly flavonoids, for new herbal drugs production. So the aim of our work was to study flavonoids of some *Salvia* species, sprouting in Ukraine. *S. officinalis, S. grandiflora, S. scabiosifolia, S. glutinosa, S. aethiopis, S. pratensis, S. stepposa, S. Sibthorpii, S. illuminata, S. nemorosa, S. pendula, S. sylvestris, S. nutans, S. austriaca, S. verticillata* and *S. cernua* leaves, gathered in summer 2010 in Crimea were objects of the studies. Extraction of the BAS was carried out by 70% ethanol. The analysis of the extracts was carried out by qualitative reactions, paper chromatography and HPLC. The determination of qualitative composition and quantitative content of flavonoids was conducted by means of Agilent Technologies chromatograph (model 1100). For the analysis chromatographic column (2.1x150 mm) filled with octadecylsilyl sorbent (3.5 µm “ZORBAX-SB C-18”) was used. The analysis was performed under following conditions: thermostate temperature - 35°C, velocity of mobile phase - 0.25 ml/min. Solution A (0.1% H₃PO₄, 180 µl/l triethylamine, 3 ml/l tetrahydrofuran in water) and solution B (MeOH) in correlation 90:10 (first 8 min), 70:30 (from 8 till 24 min) were used as mobile phase. After 24 min only solution B was used. The eluent working pressure was 240-300 cPa. The identification was made by the standards’ retention time and spectral features. It was discovered that leaves of plant species involved in this study contain mainly flavone derivatives: luteolin and apigenin. It should be mentioned that only in *S. officinalis, S. stepposa, S. glutinosa* and *S. Sibthorpii* leaves other kemperfol and quercetin derivatives are found. 39 flavonoids were discovered, 12 of them were identified as luteolin, apigenin, kaempferol, quercetin, luteolin-7-О-glucoside, rutin, apigenin-7-O-glucoside, kaempferol-3-O-glucoside, 3-methoxyluteolin, 6-hydroxyluteolin-5-glucoside, hispidulin and cersimaritin. The highest contents of flavonoids are common for *S. grandiflora, S. pratensis, S. illuminata, S. nemorosa, S. pendula, S. sylvestris, S. nutans, S. verticillata* and *S. cernua*. That indicates good prospects of using these species in pharmaceutical industry.

**Key words:** Apigenin, flavonoids, luteolin, *Salvia* species, Ukraine.

### 3.27 Spongilla Lacustris – A new Perspective Source of Raw Material

**Kyslychenko Viktoriia and Tseliuba Iuliia**  
*The National University of Pharmacy.*

**Abstract:** Spongilla (*Spongilla lacustris*) is a representative of *Spongilla* genus and belongs to the silica sponges group (*Spongilla* family). Spongilla is a fixed, moveless colony of animals which are connected to each other. Spongilla skeleton consists of silica needles joined by spogin. Spongilla is a protein very similar to chitin which forms sponge’s skeleton. Spongilla shows its biological activity in mechanical irritation of skin by silica needles and special protein – spogin. Spongilla is used as powder, ointments, crèmes that irritate skin to cure rheumatic and neurological pain as well as different injuries and bruises. Spongilla extract has anti-inflammatory, anti-edematous and transdermal action that significantly increases activity of biologically active compounds that are components of different remedies. Chopped silica needles dilate blood vessels that improves blood circulation, releases pain and resolves hematomas. That leads to a local kinin, histamine and prostaglandin release. Spongilla’s therapeutical activity is in moderate heating effect and temporary skin irritation. The aim of our work was to determine protein in spongilla powder. It is well known that proteins are one of the four main organic compounds of the living matter. However, proteins play a special role due to their structure and functions. Approximately 30% of all the proteins in human body are found in muscles, about 20% - in bones and tendons, 10% - in skin. It should be mentioned that protein has a serious impact on the process of tissue formation and leads to cornification of its upper layers as a consequence. The quantitative content of protein in Ukrainian and Chinese spongilla was determined by Kjeldahl method. According to the obtained results, Chinese spongilla contains more proteins in comparison to Ukrainian one (31.85% and 21.59% respectively).

**Key words:** Perspective source, raw material, *Spongilla Lacustris*.

### 3.28 A New Asymmetric Synthesis of the Analogue of Alkaloid Crispine A, Isolated from *Carduus crispus*

**L. Benmekhbi¹,², J. P. Hurvois³, and L. Bencharif²**

---

39

79
Abstract: Among the alkaloids, the isoquinolines are known to be numerous, displaying a wide range of biological activities; their structural diversity provided an impetus in an already fertile field of researches aimed at controlling asymmetric centres. Methods for the asymmetric synthesis of isoquinoline alkaloids have been reviewed by Chrzanowska and Rozwadowska and are based on many synthetic strategies. In this context, analogue of Crispine A (4) has been also selected as target compound. This pyrollo-isoquinoline alkaloid shows cytotoxic activity against HeLa human cancer lines, whilst its deoxygenated counterpart (−)4 exhibit antidepressant activity. We report on the synthesis of homochiral alkaloids 1–4 from α-aminonitrile. Homochiral (S)-(−)-α-methylbenzylamine served as a source of nitrogen and chirality.

Acknowledgments: The authors wish to thank University of Rennes1 for providing research facility and University of Constantine for financial support for the accomplishment of this work.

Key words: Alkaloid crispine, analogue, Carduus crispus, isolation.

3.29 Comparative GC Analysis of Seed Essential Oils from Tunisian and German Caraway (Carum carvi L.) Ecotypes

LARIBI Bochra¹, KOUKI K.,¹ BETTAIEB T¹, MOUGOU A.¹ and MARZOUK B.²

¹Institut National Agronomique de Tunis. 43, Av. Charles Nicolle-1082, Tunis, Tunisia.
²Laboratoire des Substances Bioactives, CBBC, BP 901, 2050- Hammam-Lif, Tunisia.

Abstract: The seed essential oil composition of two caraway (Carum carvi L.) ecotypes from Tunisia and Germany, cultivated under the same pedoclimatic and cultural conditions has been analysed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). The essential oil yields differed significantly between the two caraway ecotypes: 1.41% and 0.48% for Tunisian and German seeds, respectively. Forty one (41) volatile compounds were identified in the two oil samples where carvone and limonene constituted the main components but with significant different proportions. Consequently, the two caraway ecotypes displayed the same chemotype, namely carvone. Additionally, the proportions of some minor essential oil compounds such as ketones, oxygenated monoterpenes and sesquiterpenes were found to be significantly different between the German caraway seed essential oil and the Tunisian one. Since the influence of different environmental factors has been eliminated, the observed differences in seed essential oil yield and composition between the two studied ecotypes seem likely to result from the genetic variability.

Keywords: Carum carvi L, carvone, essential oil, limonene, seeds.

3.30 Strategy for the Valorization of Natural Products: Biological and Chemical Evaluation of Plant Extracts (examples of Moroccan plants)

M. Hmamouchi

President of the Arab Federation of Medicinal and Aromatic Plants, Ex-Director of the National Institute of Medicinal and Aromatic Plants in Morocco, Pr. Faculty of medicine and Pharmacy of Rabat, Morocco.

Abstract: There are approximately 60,000 plant species in Arab /Africa countries, which represent roughly a quarter of the world plants. Unfortunately, despite the wealth and endemicity of the Arab plants biodiversity and associated cultures and these regions has only contributed 83 of the world’s 1100 leading commercial medicinal plants. The world market for herbal medicines based on traditional knowledge is estimated at over US$ 60 billion, which is about 30 percent of
Arabic and Africa countries account for only 2.8 billion dollars (1.2%) of the world’s total pharmaceutical sales. So how do Arab/Africa’s almost one billion people take care of themselves if they consume only 1.2% of the total output of pharmaceutical products? Morocco has a flora rich of 4200 plants of which 800 are used.

The presentation seeks to highlight the importance of a ‘bio-rational’ approach to discovering useful natural products that build on chemo-ecological-biological insights, and the different challenges they present in practical exploitations. These will be illustrated by our on-going research activities, many examples of different bioassays (in vitro and in vivo test systems) and pharmacological tests are given, providing the reader with an insight into what is currently possible in the study of bioactive plant material. This research work concerns the, phytopharmaceutical investigation extraction, activity-guided fractionation isolation, structure determination, cultivation and structure characterization of active principle from 136 indigenous plant species, 148 Moroccan extracts, 96 Essential oils and 30 identified products. It is suggested that HMAPs have the potential to contribute to medicinal, local economies, subsistence health needs, and improved natural resources management, leading to the conservation of biodiversity and a promising economic development opportunity for the Arab/Africa countries as the region is endowed with an immense agro-ecological diversity; a wealth of plant biodiversity.

Key words: Antibacterial, antifungal, antioxidant; antitumor agents, chemical composition, enantiomeric synthesis, essential oils, protozoa diseases.

3.31 Essential Oil Variability in Natural Hahadjerine Population of Cupressus dupreziana in Tassili N’Ajjer (Algeria)

M. Ramdani¹, T. Lograda¹, P. Chalard², G. Feguiredo³, J. C. Chalchat² and A. Zeraib¹

¹Laboratory of Natural Resource Valorization, Sciences Faculty, Ferhat Abbas University, Algeria. ²Ecole nationale Supérieure de Chimie de Clermont Ferrand, Laboratoire de Chimie des Hétérocycles et des glucides, EA987, 63174 Aubière Cedex 01. ³LEXVA Analytique, 460 rue du Montant, 63110 Beaumont, France.

Abstract: Essential oils extracted from dried leaves of Cupressus dupreziana A. Camus, an endemic species in the Tassili n’Ajjer (Sahara Central Algeria), were analysed by gas chromatography coupled to mass spectrometry (GC-MS). Terpinoid analyses were performed on 13 trees in the natural population of Hahadjerine in order to determine the intra-population variability. 42 trepenoids were identified; the averages of the principal components were, Totarol (18.4%), Manoyl oxide (16%), α-pinene (11.2%) and Δ³-carene (8.3%). The terpenoid markers used made it possible to determine the individual patterns of chemotypic variability. This variability confirms that genetic factors were not responsible for the decrease in the numbers of this species.

Key words: Cupressus dupreziana, genetic variability, tassili n’ajjer, terpenoids.

3.32 Quality Management in Medicinal Plant Raw Material Production and Primary Processing Acc. to Ph. Eur (GACP)

Matthias Lorenz

PhytoConsult, Medicinal & Aromatic Plants International Projects GACP Trainings & Audits.

Abstract: GMP is standard in the production of medicinal plant products. For a long time agricultural production and primary processing remained as a “black box” out of control. Conditions in production and primary processing of MAP possess direct influence on the final quality of the API. The Good Agricultural and Collection Practice (GACP) Guidelines were developed as a prolonged GMP arm towards medicinal plant production to ensure a high and constant quality of the plant raw material. They cover agricultural production and harvest, wild Collection, cutting (on farm), drying (on farm) and juice production and distillation. Since Sept. 2009 the GACP
guidelines came into operation in the European Union. Since then all raw materials used for herbal medicinal products must be accompanied by GACP documents.

**Key words:** Medicinal plant, (GACP), processing, production, quality, raw material.

### 3.33 Chemical Constituents of the Extract Algerian *Reutera lutea* (Apiaceae)

**Makhloufi E**, **Akkal S***, **Medjroubi K**, **Elomri A**, **Laouer H**, and **Seguin S**

1Laboratoire de Phytochimie et Analyses physicochimiques et Biologiques, Département de Chimie, Faculté de Sciences exactes, Université Mentouri Constantine, Route d’Ain el Bey, 25000 Constantine, Algérie. 2Université de Rouen, UMR CNRS 6014, COBRA, UFR Médecine-Pharmacie, 22 Bd Gambetta, 76000 Rouen, France 3Laboratoire de Valorisation des Ressources Naturelles Biologiques, Département de Biologie, Université Ferhat Abbas de Sétif, Algérie.

**Abstract:** The Lamiaceae family is represented in Algeria by 28 genus and 146 species. Among this family, many plants of the genus are widely used in local herbal medicine, as they show a wide range of pharmacological activities. The purpose of this research concerns the phytochemical and the biological study of one of the Algerian flora’s medicinal plants known as *Reutera lutea*. The diverse methods of separation and purification of the methanolic extract of the *Reutera lutea* to obtain two flavonoid c-glucosides. The structure elucidation of the isolated compounds was based on analyses of their spectroscopic data (1D and 2D NMR, UV, MS).

**Key words:** Algerian *Reutera lutea*, chemical, extract.

### 3.34 Quantitative Analysis of Total Phenolic Compounds in some Medicinal Plants

**Mekhaldi, A.**

*Laboratory of Microbiology and Plant Biology, Dept. of Biology, Fac. Of Sciences, University Ibn-Badis, Mostaganem, Algeria.*

**Abstract:** Polyphenols, a group of structurally heterogeneous compounds, have been widely used in phytotherapy for a long time. Quantitative analysis of total phenolic compounds using Folin-Ciocalteu reagent were used to determine total phenols of plant extracts and the quantitative analysis of flavonoids was performed by the spectrophotometric assayas described by Kim et al. The quantitative dosage of total phenolic and flavonoids showed that *Osyris uadripartite* Salzm. And *Pistacia atlantica* Desf. Were the richest in phenolic compounds (425,43 ± 5,89 – 385,56 ± 8,43 mg GAE/g dry matter), contrary *Rosmarinus officinalis* L. and *Acacia raddiana* Savi presents highest content on flavonoids (123,56 ± 8,67 – 110,32 ± 9,12 GAE/g dry matter).

**Key words:** Flavonoids, medicinal plants, polyphenols, secondary metabolites.

### 3.35 Phytochemical Investigation and Research for the Antioxidant Activity of Polar Extract of *Santolina rosmarinifolia* Species (Asteraceae)

82
Mekkiou R¹, Boumaza O², Seghiri R¹, Ameddah S³, A. Menad³, D. Sarri¹, S. Benayache² and F. Benayache¹.

¹Laboratoire de Phytochimie et Analyses Physico-Chimiques et Biologiques, Département de Chimie, Université Mentouri, Constantine, ²Laboratoire de Valorisation des Ressources Naturelles et Synthèse de Substances Bioactives, Département de Chimie, Université Mentouri, Constantine, Route Ain El Bey, 25000 Constantine. ³Laboratoire de Biologie et Environnement, Université Mentouri, Route de Ain El Bey, 25000 Constantine, Algérie.

Abstract: This study concerns the establishment of a chemical screening of Santolina rosmarinifolia species which are wide-spread in Algeria, and known locally as Al-Djaada. In Algeria, the leaves and the flowers of this species are used in folk medicine for their gastrointestinal properties, stimulating, expectorant. Its essential oil is used as an antispasmodic, antimicrobial and antifungal. Several investigations reported that this genus reveal the presence of some chemical groups. Extracts obtained after a hydroalcoholic extraction were subjected to a qualitative analysis TLC polyamide (Thin Layer Chromatography), CP and quantitative analysis by using the test of Folin-Ciocalteu. These analyses of extracts (ethyl acetate and n-butanol) showed the presence of polyphenols The analysis on CP chromatography of the ethyl acetate extract allowed us to isolate four products in the pure state and to determine the structure of two of them, of besides an isolated product of the n-butanol extract. The structures of the compounds were elucidated by UV, IR, EIMS and extensive application of one and two dimensional NMR spectroscopy as well as by comparing their spectroscopic data with those reported in the literature. The test of the antioxidant activity (test in the DPPH) revealed that the extracts of flowers and leaves of Santolina rosmarinifolia are active in various degrees.

Key words: Antioxidant activity, chemical screening, flavanoids, polyphenols, Santolina rosmarinifolia.

3.36 Standardization and Application Study on Paronychia Argentea

Mohammad, Z., Yousif, H., and Suleiman Olimat
Department of Pharmaceutical Sciences, Faculty of Pharmacy, University of Jordan, Amman, Jordan.

Abstract: Paronychia argentea is a perennial herb, widely distributed in Jordan. Several studies showed that Paronychia argentea has hypoglycemic activity, it has been proved to be useful as gastric analgesic, bladder, prostate, abdominal ailments treatment, and stomach ulcers treatment, and it also showed significant alpha amylase and acetyl cholinesterase (AChE) enzyme inhibitory activity. The plant extract of Paronychia argentea showed antioxidant activity. Other in vivo and invitro studies on different extracts from Paronychia argentea revealed the immunomodulating activity of the plant. The aim of our study was to standardize the drug preparation by quantifying the main active component using HPLC, application of P. argentea in therapy. One kilogram of dry plant (Paronychia argenteae) soaked in 20 liters of propylene glycol (5%). The extract was filtered and used as a stock in the experiment (5% stock solution). Also Vanillic acid standard material was dissolved in methanol and injected in the HPLC system. Mobile phase was prepared as follows: Methanol: Water containing 1% Acetic acid (30:70), HPLC system prepared using the above mobile phase at flow rate 1.0 ml/min and wavelength 260 nm. Injection volume was 20µL. Results showed that vanillic acid standard material injected in the HPLC system, a peak of vanillic acid appears at 7.6 min, then a sample from the plant extract was injected and two peaks appear at 6.8 min, 7.6 min respectively. To check vanillic acid peak, small quantity of vanillin acid was added to the extract and then injected, an increase in the peak appears at 7.6 min (in the previous injection) indicates that peak at 7.6 min refer to vanillic acid in the extract. In conclusion, a standardized HPLC method of analysis for the final dosage formula was developed successfully based on vanillic acid as a reference standard. The method validation is proceeding to ensure that the method is a stability indicating method for the formula

Key words: Paronychia argentea, Standardization, Vanillic acid, Natural Products.
3.37 Characterization and Optimization of *Hirschfeldia incana* and *Raphanus raphanistrum* two North African Cruciferae


1 Université Saad Dahleb, Faculté des Sciences Agro-Vétérinaires, Département d’Agronomie, B.P. 270, route de Soumaa Blida. 2 Ministère de l’Agriculture et du Développement Rural, Direction de la Protection des Végétaux et Contrôle Technique, 12, Avenue Colonel Amrouche. 3 Université Ibn Khaldoun, BP 78. Algérie.

**Abstract:** Focused reviews have specifically examined the glucosinolates in the Brassicaceae family regarding specific aspects of their biology, structure and chemical groups of compounds according to their structural similarities. This study is interested in the glucosinolate content of various organs of *Hirschfeldia incana* and *Raphanus raphanistrum*, and was analyzed during the critical phases of their cycle ie flowering and fruit set. A difference of accumulation is very marked between species and between phenological stages other hand. *Hirschfeldia incana* differs from *Raphanus raphanistrum* by a supplement in terms of storage capacity in molecules of glucosinolates. It appears that *Hirschfeldia incana* has a significant storage capacity in the flowering stage compared with the potential for accumulation of *Raphanus raphanistrum*. At Fruit set stage, there is a duplication of accumulated amounts of glucosinolates, which reflects a certain equality in productive capacity of the two species. Fluctuating amounts of glucosinolates shows a tendency to higher flowering stage to fruit set stage. We note a very significant overhaul of most of the molecules characterized (3 molecules of 4 molecules) namely, sinigrin, and the Glucoberverine Glucoberteroine. Changes in the rates of sinigrin (61.21 %) and Glucoberverine (51.77 %) has been reported from the flowering stage to fruit set stage Glucoberverine the rates are scaled down (18, 02 %) with respect *Raphanus raphanistrum*. For *Hirschfeldia incana*, we also note a very significant overhaul of a minor number of molecules characterized (3 molecules of 7 molecules) ie sinigrin, the Glucoberverine and pentenyl.

**Key words:** Brassicaceae, glucosinolate makers, *Hirschfeldia incana*, *Raphanus raphanistrum*.

---

3.38 Comparative Study of Metabolomic Profile from Species of *Taraxacum*

**Muñoz–Mingarro Dolores**, **Martínez Alcazar M Paz**, **Acero de Mesa Nuria**, **López** and **Gonzálvez M Ángeles**


**Abstract:** The genus Taraxacum (“Dandelion”) has long been used in traditional medicine for the treatment of various ailments such as liver complaints, heartburn and anorexia. Although monographs about Taraxacum reveal their therapeutic uses, currently available scientific information to justify them is very limited; in fact they are mainly based on empirical findings. In addition this genus presents great interest from the botanical point of view due to its complex systematic. Therefore, a precise identification of species including a comparative study of the profiles of metabolites is required. Extracts (methanol, 80%) of aerial part of *T. lacistrum*, *T. obovatum*, *T. hispanicum*, *T. lambinonii* and *T. marginellum* were obtained and analyzed by capillary electrophoresis (CE)–TOF-MS. Additionally, potential antioxidant activity and cytotoxic effect on cell lines culture has been evaluated by in vitro assays. In the metabolic profiles obtained the compounds were characterized by their molecular weight, retention time and the intensity of their signal. The data obtained were subjected to a statistical handling with the Mass Profiler Professional B.02.01 (Agilent) Software for the alignment and filtering and SIMCA-P+ 12.0.1 (Umetris) for multivariate analysis that allowed screening the similarities and differences between the species. The accurate masses of features with significant differences were searched Plant Metabolic Network (www.plantcyc.org) public databases. This work shows the complexity of the comparative study and therefore it requires inquiring into the results, in order to characterize each
species. With regard to the results of the antioxidant capacity and cytotoxic effect it follows the need to assess more biological activities and to identify the metabolites of interest in each species. Also it should be noted that it has been revealed the importance of the use of an emerging technique as CE-MS in metabolomic studies.

**Key words:** Comparative study, metabolomic profile, taraxacum

### 3.39 Extraction of Antioxidants in Oil Palm Fruit Sterilization Derived Condensate

*Nipon Pisutpaisal*¹,² and Tipakorn Suwannarat¹

¹Division of environmental technology, Department of Agro-Industrial Technology, Faculty of Applied Science, King Mongkut’s University of Technology North Bangkok, ²The Research and Technolo Center for Renewable Products and Energy, King Mongkut’s University of Technology North Bangko. Thailand.

**Abstract:** This research harvested the solid power in oil palm fruit sterilization derived condensate using electrocoagulation before the antioxidants in the powder were extracted. The optimal conditions for the electrocoagulation were 1.3 ampere and 60 minute retention time. At this conditions, chemical oxygen demand (COD) in the condensate was removed approximately, 74.1%. Methanol is the best solvent to solubilize antioxidants from the powder. DPPH (2,2-diphenyl-1-picrylhydrazyl radical, DPPH) test confirmed that methanol extract contained antioxidants. The binding percentage of the methanol extract with free radicals was 68.8%. The antioxidants in the methanol extract were isolated and purified by using Liquid Chromatography and Thin layer chromatography. The purified antioxidant is anisole and esters of the omega-3 (Omega-3) which is connected to the ethylene glycol after chemical identification using Fourier trans form infrared spectroscopy (FT-IR) and nuclear magnetic resonance spectroscopy (NRM) were performed.

**Key words:** Antioxidants, electrocoagulation, methanol, oil palm, solid power.

### 3.40 Phytochemical Study of Ethyl Acetate Extract and Antioxidant Activity of the Species *Genista quadriflora* (Fabaceaes)

*O. BOUMAZA*¹; R. BOUKAABECHE ¹; R. MEKKIOU²; R. SEGHIRI²; D. ZAMA¹; D. SARRI; F. BENAYACHE²; and S. BENAYACHE¹.

¹Laboratory of Natural Resource Development, Department of Chemistry, Faculty of Exact Sciences, University Mentouri Constantine. ²Laboratory of phytochemical analysis Physico-Chemical and Biological Chemistry Department, Faculty of Exact Sciences, University Mentouri Constantine.

**Abstract:** Genista species contain a variety of secondary metabolites of various types, especially isoflavonoids, which have been shown to be biologically active. In a continuous of our studies of Algerian medicinal and endemic plants of the Genista species (Fabaceae). Aerial parts of *Genista quadriflora* were dried (1130 g), and macerated with MeOH–H₂O (80:20, v/v) for 24 hours three times. The crude extract was concentrated at room temp. and diluted with 500 ml H₂O. The remaining aqueous solution was extracted successively with petroleum ether, CHCl₃, EtOAc and n-BuOH. The organic layers were dried with Na₂SO₄ giving after removal of solvents under red. Pressure, petroleum ether (0.25g), CHCl₃ (3g), EtOAc (6g) and n-BuOH (60g) extracts respectively. The ethyl acetate extract was chromatographed on silica gel by gradient elution with CHCl₃-MeOH, the isolation and purification was performed by TLC on silica gel, leading to some compounds (flavonoids and isoflavonoids). These compounds were identified by spectral analysis. The extracts of *G. quadriflora* were examined for in vitro antioxidant properties using DPPH test. The results showed that a different extracts had significant activity. On the basis
of this result, ethyl acetate extract was chromatographed. During this study, the chemical screening of the plant Genista quadriflora (species endemic in Algeria and Morocco), and also the quantitative analysis (TLC polyamide and chromatography on paper) of ethyl acetate extract of the aerial part shows presence of several chemical groups. The test of the antioxidant activity (test in the DPPH) shows that extracts of aerial parts of Genista quadriflora are actives. The chromatographic study on silica gel of ethyl acetate extract allowed us to isolate and identify the secondary metabolites of flavonoid and isoflavonoid type. The DPPH radical scavenging ability of different extracts of Genista quadriflora was calculated in a dose-dependent manner. Different extracts of this plant proved to be an effective scavenger of DPPH radicals. The experimental results show that all substances had antioxidant activity in vitro but their capabilities differed for the different indicators.

Acknowledgements: The authors wish to thank Dr. D. Sarri (Biology Department, University of M'Sila, Algeria) for identification of plant material, and MESRS (Ministry of scientific research, Algeria) for financial support.

Key words: Antioxidant activity, flavonoid, isoflavonoid, Genista Quadriflora.

3.41 Morphological, Physical Chemistry Analysis and Secondary Metabolites Investigation of Cistus creticus

R. Sahraoui1, S. Djellali2, and A. Chaker1

1Département Biologie and Ecologie Végétale, Université Ferhat Abbas, 19000, Sétif.
2Département des Sciences de la Matière, Centre Universitaire de Bordj Bouarréridj, 34000, Bordj Bouarréridj, Algérie.

Abstract: The aim of this work is to study the secondary metabolites and the physicochemical properties of Cistus Creticus in addition to morphological characteristics for better knowledge. The literature indicates that this plant shows anti-inflammatory and antiviral properties. Locally it is used as sedative drink. The plant was collected from mountains surrounding the city of Batna (East of Algeria). Morphological characteristics of leaves and trichomes type were determined; leaves were then separated from stems, cleaned of impurities and dried for a few days at room temperature in shaded and ventilated place before being ground to a powder. The powder was then subjected to the following analyses: i) phytochemical analysis using extraction with solvents of increasing polarity and qualitative determination of secondary metabolites and ii) chemical and physicochemical analysis where the humidity, percentage of ash and metals content are calculated. The solvent extraction showed a high yield of polar compounds (5.76%) compared to apolar compounds (1.08%) while the chemical tests reveal the presence of alkaloids, heterosides, triterpenes, cyanidin, flavonoids, and saponosides. In addition, it was found that the ash of the plant contains low amounts of toxic metals such as Hg and Pb which makes the plant safe to use.

Key words: Cistus creticus, Phytochemistry, Trichomes, Secondary metabolites.

3.42 Preliminary Study of an Algerian Astéraceae: Nauplius graveolens

RAMDANE F., and HADJ MAHAMMED M.
Laboratory of Biogéochemistry. Ouargla University. Algéria.

Abstract: The chemical composition of essential oils obtained by steam water distillation from the dried aerial parts of Nauplius graveolens were analysed by gas chromatography (GC-FID) and coupled to mass spectrometry (GC-MS). By water steam distillation the dried aerial parts of Nauplius graveolens yielded 0.08-0.1% of essential oils having an intense and penetrating odor. By using GC and GC-MS analysis thirty three compounds were determined in the reported essential oil representing 75.34% of the total content. The major chemical constituents of this oils belong to terpenes were: α-cadinene 33.75%, 2, 6, 6- triméthylacétate de bicyclo hept-2- en- 4-ol, 13.91%, liguloxide 9.47%, mertenyl acétate 6.50%, β-eudesmol 1.29% and α-eudesmol 1.00%. The essential oils were found to show a broad spectrum of antimicrobial activity against the tested bacterial strains.

Key words: Astéraceaes, biological activity, essential oils, GC-MS, Nauplius graveolens.

3.43 Analysis of Anti-lipo-peroxidation of Medicinal Plant Daphne gnidium L.
Sabah BOUMERFEG¹, Abderrahmane BAGHIANI², Djamila AMENI², Meriem DJARMOUNI², Moufida ADJADJ², Seddik KHENNOUF³ and Lekhmici ARRAR².

¹Department of Nature and Life Sciences, University of Bordj Bou Arreridj. ²Laboratory of Applied Biochemistry, Department of Biochemistry. Faculty of Nature and Life Sciences, University Ferhat Abbas. ³Laboratory of Phytotherapy Applied to Chronic Diseases, Department of Animal Biology and Physiology, Faculty of Nature and Life Sciences, University Ferhat Abbas, Setif, Algeria.

Abstract: The antioxidant activities of subfractions; methanol (CE), chloroform (CHE) and ethyl acetate (EAE) of Daphne gnidium L. extracts (DGE) were investigated employing various established systems. Total phenolic and flavonoid contents in these extracts were determined by a colorimetric method. Values varied between 130.84 ± 5.99 and 137 ± 7.66 mg equivalent gallic acid/g lyophilisate. In the cellular system, all the extracts showed a protective effect greater than those of Quercetin, rutin and gallic acid against t-BHP induced oxidative damages in human erythrocytes. These results were clearly confirmed by a modified thiobarbituric acid-reactive species (TBARS). In order to more clarify the antioxidants activities of the extracts through other mechanisms the iron chelating ability assay was realized. The results showed that the iron chelating ability of DGE was very effective; the CE showed an excellent chelating with IC₅₀ of 8.171 ± 0.953 µM/quercetin equivalent, lower than that of EDTA with approximately 17 folds. These results show that Daphne gnidium L. extracts have strong anti-oxidant effects and may have some clinical benefits.

Key words: Antioxidant activity, chelating activity, daphne gnidium L, ferrous, polyphenol.

3.44 Lyofiliation Procefor the Isolation of Natural Compounds - Anthocyanins

Salamon, Ivan¹, Böckem, M², and Grulova, D³.

¹Excellence Centre of Animal and Human Ecology, Univerity of Presov in Presov. ²Gea Process Engineering, Kalscheurener Strasse 95, 50354 Hürst, Germany. ³Department of Ecology, The Faculty of Humanity and Natural Sciences, University of Presov in Presov, 17th November Street, 08001 Presov Slovak Republic.

Abstract: Anthocyanins are one of the many natural compounds classes that belong to the polyphenolic flavonoid group. This group of species are distinguished for their role in conferring the bright red, blue and purple colors of berries and fruits. Selected natural secondary metabolites are an essential part of phytotropical preparations which are most effective source of natural healing. Isolation of natural substances from the plant material is carried out by steam distillation and extraction in various extraction reagents. The methods of separation with their specific conditions (high temperature, aggressive solvents, etc.) means, in many cases, changes in the structures of secondary metabolites, thereby reducing their therapeutic effect. In connection with these facts insulation of components by the method of lyofiliation appears to be a real method, in which the structure of qualitative and quantitative properties are not changed. The aim of the research project had been to study the isolation of natural compounds - anthocyanins – from the fruits of selected plants species by the method of drying freezing. Blueberry (Vaccinium corymbosum L.) and blackcurrant (Ribes nigrum L.) was selected for the initiation lyofiliation proces and was done with cooperation by the company GEA Lyophil SMART® SL 2. Fruits (or extracts) were cleaned and mixed in + 10 °C. Mixture was stored in stainless steel tape and the lyofiliation was made. The behavior of the product was studied while it was being cooled down to the temperature lower than -80 °C and subsequently reheated in an alcohol bath. During the cooling proces most of the components crystalized at the temperature between -5 and -45 °C. Some few components were frozen at a temperature ranged from -25°C until -75 °C. The degree range for beginning start melting during reheating process was between -20 °C - -45°C.

Key words: Anthocyanins, extracts, lyofiliation, natural compounds.
3.45 Chemical Composition of The Extracts and Anti-Oxydant Activity of Chromatoraphic Fractions of *Pistacia lentiscus*

**SALIMA SEBAIHI, DINA A., MERIEM B., KARIMA A., NASSIMA C. and D. ATMANI**

*Laboratory of Applied Biochemistry, Department of Physico-Chemical Biology Faculty of Life and Nature Sciences, University Abderrahmane Mira.*

**Abstract:** Medicinal plants constitute an important source of active substances as they have a remarkable role in traditional medicine. Our study was carried out on the anti-radical activity of the leaf extracts of *Pistacia lentiscus* on DPPH and OH (DPPH test was evaluated by Massuda et al. 1999 and OH test was evaluated by Halliwell and Gutteridge 1987). The extracts that gave high antiradical activities were then fractionated by thin layer and column chromatographies, in order to characterize and determine the active fractions. The best scavenging activity against DPPH was obtained by the aqueous of chloroform extract at 100µg/ml with an IC$_{50}$ of 3.84µg/ml, the aqueous of ethyl acetate being more potent against the OH radical, with an IC$_{50}$ of 20.6µg/ml. Fractions F$_2$ and F$_3$ obtained by column chromatography on silica gel from both extracts have exhibited an important anti-radical activity against the two radicals. On the other hand, thin layer chromatography has allowed us to detect the probable presence of gallic acid, quercetin and catechic tannins in these fractions. Quantification of total phenol (the determination of total phenols was estimated by Kähkönen et al. 1999) has demonstrated a high amount of these compounds in the aqueous of chloroform and ethanolic extracts (491.7mg and 388.2 mg Eq cat/g extract) respectively which confirms the richness of *Pistacia lentiscus* in phenolic compounds.

**Key words:** Anti-radicalaire, fractions chromatographiques, *Pistacia lentiscus*, polyphénols

3.46 Kava (*Piper methysticum*): Phytochemistry, Traditional Cultivars and Toxicity

**Schmidt Mathias$^1$, Lebot Vincent$^2$, and Vergano Paolo$^3$**

$^1$Herbresearch Germany, Wartbergweg 15, 86874 Mattsies, Germany. $^2$CIRAD, Port Vila, Efate, Vanuatu. $^3$FratiniVergano, 42 Rue de Haerne, 1040 Brussels, Belgium.

**Abstract:** Kava, the root of *Piper methysticum*, is an important endemic cultural plant in the South Pacific Islands. More than 120 cultivars have been bred and selected for medicinal or social use. Some of these cultivars are known to be suitable for daily consumption of kava as a social beverage facilitating communication without having intoxicating effects. These cultivars are called „noble“, whereas others, the „two-day“ varieties, are known to produce long lasting effects and hang-over, and are therefore not used for traditional kava drinking. The use of peelings and rhizomes of two-day varieties have been suspected to have been involved in the sudden occurrence of cases of liver toxicity in Europe in 1999 and 2000, however, no clear correlation could be made between the composition of kavalactones – the fraction assumed to be responsible for the psychorelaxing effects – and toxicity. Albeit the distribution of the six major kavalactones and especially the relative quantities of kavain and of methylsticin/dihydromethylsticin vary distinctly between noble and non-noble cultivars (the latter containing less kavain and more M/DHM). The kavalactones as such are obviously not liver-toxic. Recent research pointed to the fraction of flavokavins, especially flavokavin B, which has been found toxic in rodents. In a pilot screening study we sampled typical varieties of the major types of cultivars: two noble kavas, two two-day varieties and one wild-type kava, each of them representative for a group of cultivars with similar kavalactone composition. The material was separated by roots, peeled rhizomes, peeled stems and the peelings. All samples were subjected to HPLC quantification of the six major kavalactones and the flavokavins A to C. Non-noble kava varieties were found to contain 10 times more flavokavins and especially flavokavin B than noble kava. There was an association between the kavalactones M and DHM and the content of flavokavin B. This association may be used to identify kava unsuitable for consumption (and potentially toxic) even in exported kava raw materials. It may also serve for establishing international quality standards for kava.

**Key words:** flavokavin, kava, liver toxicity, medicinal, *Piper methysti*
3.47 Identification of ferulol and 4-hydroxycoumarin in *Ferula communis* samples collected in Jordan using GC-MS and HPLC methods

Shudiefat M. F1, Al-Khalidi K. M1, Alzweiri M2, Afifi, Fatma U2.

1Royal Botanic Garden, Amman 11910 Jordan, Jordan. 2Faculty of Pharmacy, University of Jordan, Queen Rania AlAbdullah Street, Amman 11942, Jordan.

**Abstract:** Mostly growing in arid areas, the genus *Ferula* is widely distributed from the east Mediterranean region to central Asia. *F. communis*, the giant fennel, known with the Arabic name “kelh” is represented in Jordan by four species, namely *F. blanchei*, *F. communis*, *F. ovina* and *F. sinaica*. The objectives of the present study was primarily to identify qualitatively and quantitatively 4-hydroxy-coumarin and ferulenol in *F. communis* samples collected in bi-weekly intervals from the vicinity of Amman (Tel al-Rumman Area) between beginning of January 2012 and end of March 2012. Fresh and dried plants from each collected specimen were extracted with four different solvents: chloroform, butanol, ethanol and water. After evaporation of the solvent the obtained syrupy residues each 100 mg was dissolved in the HPLC grade solvent and used for HPLC analysis for qualitative and quantitative analysis. GC-MS analysis was carried out after derivatisation. 4-hydroxycoumarin was detected in the ethanol extracts of fresh and dry samples, in small amounts in the water extracts, while negligible quantities were found in butanol extracts. Chloroform extract was free of this compound in HPLC method of determination, while ferulenol was found in dry ethanol extracts using TLC and HPLC. The study was undertaken to find an answer to the reported fatalities observed with the sheep as reported by some farmers in the area. Further experiments are needed to determine the chemotype of the *F. communis* growing in Jordan since ferulenol is reported as the main constituent responsible for the haemorrhages in sheep.

**Key words:** Identification, *Ferula communis* ferulenol, Jordan, 4-hydroxycoumarin.

3.48 Optimization of Bioactive Molecules Extraction from Olive Leaves of *Swebea elgia* Variety

SIFAOUI Ines1, CHAMMEM Nadia,2 Ben SLAMA Mourad,2 HAMDI Moktar,2 Mejri Mondher1, ABDERABBA Manef1

1Laboratoire Matériaux- Molécules et applications, IPEST, route Sidi Bou Said,B.P:51 2075 La Marsa,2Laboratoire d'Ecologie et de Technologie Microbienne, INSAT, Tunisia.

**Abstract:** In Mediterranean basin, our ancestors used olive oil to treat aches, ulcers and even cholera. Olive leaves were also used as remedies for all kinds of inflammation. Nowadays, several studies continue investigating in the biological activities of the leaves extracts against several pathologies. Their extraction should therefore be optimized. The present work was precisely carried out for this purpose. In fact, a 10-point augmented simplex-centroid design was used to formulate the three-component mixture systems comprised of water, ethanol and methanol. The 10 points consisted of three single component systems, three binary mixtures and four ternary mixtures. Phenols and flavonoids levels, the antioxidant (measured with ABTS method) and antibacterial activities were selected as the responses for the combination of the independent variables. The experimental results fitted well to a first-order polynomial model and more than 95% of the variability was explained for all responses. All responses showed different patterns of extractability, with a significant variation in the linear and interaction effects of the independent variables. The desirability function was then employed in addition to the simultaneous optimization of the compounds. The optimal mixture identified was: 7.5% water, 15.1% ethanol and 77.4% methanol. Under this conditions, the yields of total phenolic and flavonoid were respectively 165.27mg EAG/gdm and 117.42mg ER/gdm of olive leaves and the antioxidant activity measured by ABTS method was at 239.17mM trolox/g dm of olive leaves. Also those condition permits an inhibition of 40% for *Pseudomonas aeruginosa* and *Salmonella typhimurium* and of 70% of *Escherichia coli* and *Klebsiella pneumonia* at 100μgdwm of olive leaves/ml. Through correlation analysis for phytochemical contents with antioxidant and antibacterial activities of extract of olive
leaves, the contents of phenolics and flavonoids exhibited good correlation with antioxidant activity and antibacterial against three bacteria *Escherichia coli*, *Klebsiella pneumoniae* and *Salmonella typhimurium*. However, a non-significant correlation was found between those compounds and the inhibition growth of *Pseudomonas aeruginosa*.

**Key words:** Bioactive molecules extraction, olive leaves, optimization, *Swebea elgia*.

### 3.49 Flavonoids from the Andemic Plant *Henophyto deserti*

**Smadi Abla**¹, **Bitam Fatma**¹, **Ciavatta Maria Letizia**², and **Dridi, Seloua**¹

¹Faculté des sciences, département de Chimie, Université de Batna, Batna 05000, Algérie. ²Istituto di Chimica Biomolecolare, C.N.R., Via Campi Flegrei 34, I-80078 Pozzuoli, Naples, Italy.

**Abstract:** The Brassicaceae family is one of the largest families in the plant kingdom and it contains many medicinal plants. It includes about 19 tribes, 350 genera and more than 3500 species. Many of the Brassicaceae plants serve as a source of food and condiment such as cabbage, turnip, radish and mustard. All of them contained unusual flavonoids and glucosinolates. Flora of Algeria appears to be a rich and interesting source for supplementary ethnomedicinal and phytochemical studies. *Henophyto deserti* is an endemic plant found in north Algerian Sahara commonly known as Hannet l’ibel, this shrub has great potentialities to provide different products and services as forage, traditional medicine, halting desert encroachment and stabilizing sand dunes. The seeds and leaves of these plants are usually prepared and used to treat digestive problems, arthritis, colds and flu, fevers, irritability, and scorpion bites. To the best to our knowledge, very few chemical studies have been reported from this species. The phytochemical investigation of the ethyl acetate extract of the aerial parts of this plant yielded two flavonoids glycosides and two steroids. The characterization of the compounds was achieved by various spectroscopic methods mainly ¹H NMR, ¹³C NMR and mass spectrometry.

**Key words:** Brassicaceae, flavonoids glycosides, *Henophyto deserti*, steroids.

### 3.50 Chemical Composition and Antimicrobial Activity of the Essential Oils of *Senecio perralderianus*, An Endemic Species of Algeria

**T. Lograda**¹, **M. Ramdani**¹, **J. C. Chalchat**², **P. Chalard**² and **G. Feguiredo**³

¹Laboratory of Natural Resource Valorization, Sciences Faculty, Ferhat Abbas University, 19000 Sell, Algeria. ²Ecole nationale Supérieure de Chimie de Clermont Ferrand, Laboratoire de Chimie des Hétérocycles et des glucides, EA987, 63174 Aubière Cedex 01. ³LEXVA Analytique, 460 rue du Montant, 63110 Beaumont, France.

**Abstract:** The aim of the present study is to investigate the antimicrobial activity of the essential oil prepared from aerial parts of the Algerien endemic *Senecio perralderianus* Coss. & Dur. (Asteraceae). The dried-in-shade at ambient temperature aerial parts of the plant were hydrodistilled for 3h, using a modified Clevenger-type apparatus. The extract is analysed by gas chromatography-mass spectrometry. 50 compounds were identified, constituting over 96.1%, of total oil composition. The main compounds in the essential oils of *S. perralderianus* were γ-cadinene (15.3%), α-pinene (8.8%), D-germacrene (5.8%), α-caryophyllene (5.5%) and γ-eudismol (4.9%). In vitro antibacterial studies were carried out against four bacteria strains and *Candida albicans*. The antimicrobial activity of the essential oil was carried out with the disc diffusion method. The results indicated that the essential oil remarkably inhibited the growth of tested microorganisms except *Candida albicans*.  

90
3.51 Phytochemical Investigation of an Anti-Diabetic Herb: *Juglans regia* L. Leaves Cultivated in Algeria

**Tigrine-Kordjani Nacéra and Boukhari Fayçal**

Laboratoire d’Analyse Organique Fonctionnelle, Faculté de Chimie, Université des Sciences et de la Technologie Houari Boumediene, BP 32, El Alia, Bab Ezzouar, 16111 Alger, Algérie

**Abstract:** *Juglans regia* L. is a tree that belongs to the family Juglandaceae, it is commonly called walnut. Different parts of this tree, especially the leaves, are used in traditional medicine to treat several diseases including diabetes. The literature is very rich in information about the heavy fraction including phenolic compounds, several studies have been conducted on oil fruits showing that it is rich in polyunsaturated fatty acids, unlike the volatile fraction of walnut leaves was a subject of limited investigations. The objective of this study was to determine, for the first time, the chemical composition of the volatile fraction of fresh leaves of walnut cultivated in Algeria. The extraction of essential oil was performed by conventional hydrodistillation (HD) and by microwave-assisted hydrodistillation (MAHD). Chemical Identification by GC-MS and quantification of constituents by GC-FID had shown a variation in phytochemical composition of essential oils obtained by both techniques. Indeed, we identified 38 compounds in the essential oil extracted by MAHD for one hour (1h) with a yield of 0.05% (w / w) and 37 compounds obtained by HD for three hours (3h) of extraction with a lower yield 0.03% (w / w). The major compounds were α-pinene, β-pinene, dlimonene, germecrene D, caryophyllene and farnesene.

**Key words:** Distillation, essential oil, *Juglans regia*, medicinal plant, monoterpenes, walnut, sesquiterpenes.

3.52 Isolation of Volatile Oil with Antifungal Activity from Horseradish (*Armoracia rusticana*)


1Department of Botany, Division of Pharmacognosy, University of Debrecen 2Department of Microbial biotechnology and cell biology, University of Debrecen 3Department of Organic Chemistry, University of Debrecen

**Abstract:** *Armoracia rusticana*, *Cochlearia armoracia*, *Armoracia lapthifolia* are scientific names that refer to a perennial plant commonly known as horseradish. *Armoracia rusticana* is rich in glucosinolates (GLS), secondary products which play an important role in the plant's defensive system. GLS consist of β-thioglucoside N-hydroxysulfates with a side chain (R) and a sulfur-linked β-D-glucopyranose moiety. Myrosinase reacts with GLS resulting in an unstable aglucone – thiophosphate-O-sulfonates, which then give rise to different products depending on reaction conditions and participation of other factors. Under the effect of myrosinase the products of GLS hydrolysis reaction are mainly isothiocyanates (ITCs). It is obviously shown that allyl isothiocyanate (AITC) and 2-phenylethyl isothiocyanate (PEITC) are the most common components found in horseradish root. Isothiocyanates (ITCs) have many pharmacological effects, they're recognized as anti-carcinogenic, gastro-protecting, anti-microbial, cell cycle inhibiting, apoptosis triggering etc. activities. Volatile oil of horseradish was isolated and collected by steam distillation from the root of *A. rusticana*. The major and minor components of the essential oil were identified and quantified by GC-MS (Agilent 7890A GC, Agilent 5975 MS). Antifungal activity was measured by microdilution method in *Aspergillus nidulans*, *A. fumigatus*, *Candida albicans*, *Saccharomyces cerevisiae* The essential oil yield was 0.1% on raw weight basis. Allyl isothiocyanate, n-butyl isothiocyanate, 3-butenyl isothiocyanate, 4-pentenyl isothiocyanate, 5-hexenyl ITC, 5-methylsulphinylpentyl isothiocyanate were identified from the essential oil. The allyl isothiocyanate (AITC) and 2-phenylethyl isothiocyanate (PEITC) were the main component of the volatile oil. Strong antifungal activity was detected in all tested organisms. The most sensitive strains were the *A. nidulans* and *C. albicans.*
Key words: Antifungal, Armoracia rusticana, horseradish, volatile oil.

3.53 Standardisation and Quality Control of Herbal Medicinal Products

Viljoen, Alvaro and Vermaak, Ilze
Department of Pharmaceutical Sciences, Faculty of Science, Tshwane University of Technology, Private Bag X680, Pretoria 0001, South Africa.

Abstract: It is a well-known fact that 80% of the world’s population use herbal medicines. The herbal medicines market has increased dramatically in recent years as consumers became more health conscious, herbal medicines are considered safe by consumers and these products are generally less expensive than allopathic medicines. These products are however not rigorously regulated and quality and safety cannot be guaranteed. In fact, many cases of toxicity have been reported, in some cases due to errors in species identification which is, or should be, one of the first steps in a herbal quality control protocol. Established, methodical processes are necessary to standardise herbal medicines to produce consistent and reproducible products. Herbal medicines pose significant standardisation and quality control challenges due to their innate phytochemical complexity and intraspecies variability. Standardisation and quality control involves inter alia the authentication of plants followed by the quantification of identified biomarkers and the selection and cultivation of the chemotype with the desired characteristics (e.g. ratios of biomarkers). Vibrational spectroscopy has been identified and implemented as an important quality control technique in the pharmaceutical, food and beverage and agricultural industries. The technique has gained popularity as it is non-destructive, inexpensive, and any sample matrix (powder, liquid, essential oils) can be tested with minimal or no sample preparation. Therefore, no bias is introduced as a result of using different extraction solvents and the entire metabolome is used. The large datasets obtained using vibrational spectroscopy (NIR, MIR and hyperspectral imaging) are analysed using chemometric data analysis. This allows for species authentication using discrimination models constructed using the orthogonal projections to latent structures (OPLS) technique. In combination with data obtained from standard analytical methods (e.g. LC-MS), calibration models which correlates the information in the spectral data to the chemical or reference data was used to quantify biomarkers. In addition, cluster formation during exploratory principle component analysis supplies valuable information through the detection of similarities between samples. This may be used in conjunction with hierarchial cluster analysis to identify and suggest the best chemotype to cultivate. Several examples related to quality control and standardisation of medicinally and commercially important plant species will be discussed: Species authentication and/or biomarker quantification (Agathosma, Harpagophytum, Illicium and Pelargonium species); chemotype selection (Sceletium tortuosum).

Key words: Herbal products, medicinal plant, quality control, standardisation.

3.54 Volatile Terpenes Determined in the Emission of Some Plants by Means of SPME and Chiral GC/MS

Yassaa Noureddine
USTHB, University of Sciences and Technology Houari Boumediene, Faculty of Chemistry, B.P. 32 El-Alia, Bab-Ezzouar, 16111 Algiers, Algeria.

Abstract: Plants are known to defend themselves against herbivores with chemical defences that directly influence herbivore performance and indirectly by releasing chemicals such as monoterpenes that attract the natural enemies of the herbivore. Many of the monoterpenes produced by plants and insects exist in two enantiomeric forms. A Solid Phase MicroExtraction (SPME) method has been validated for the determination of enantiomeric and non-enantiomeric monoterpenes emitted by plants. These compounds were adsorbed in the field, and then thermally desorbed at 250°C in a gas chromatograph injector port connected via a -cyclodextrin capillary separating column to a mass spectrometer. The optimized method has been applied for investigating the emissions of enantiomeric monoterpenes from Pseudotsuga Menziesii (Douglas-fir), Rosmarinus officinalis (Rosemary) and Lavandula lanata (Lavender) which were selected as
representative of coniferous trees and aromatic plants, respectively. The enantiomers of \(\alpha\)-pinene, sabinene, camphene, \(\beta\)-3-carene, \(\alpha\)-pinene, limonene, \(\alpha\)-phellandrene, 4-carene and camphor were successfully determined in the emissions from the three plants. While Douglas-fir showed a strong predominance toward \((-\))\-enantiomers, Rosemary and Lavender demonstrated a large variation in enantiomeric distribution of monoterpenes. The simplicity, rapidity and sensitivity of SPME coupled to chiral capillary GC/MS makes this method potentially useful for in-field investigations of plant-insect interaction.

**Key words:** Chiral GC, emission plant, volatile terpenes.

### 3.55 A new 3-O-Sulfo-Triterpenoid Saponin from *Gypsophila richotoma* Wend

Yotova, Maya\(^1\), Krasteva, Iliana\(^1\), Jenett-Siems, Kristina\(^2\), and Nikolov, Stefan\(^1\)

\(^1\)Department of Pharmacognosy, Faculty of Pharmacy, Medical University, 2 Dunav str., 1000 Sofia, Bulgaria. \(^2\)Institute of Pharmacy, Free University Berlin, Königin-Luise-Str. 2+4, D-14195 Berlin, Germany.

**Abstract:** The *Gypsophila* species are well known by their medicinal, decorative and industrial application. The plants are studied for saponins, flavonoids, sterols, cyclopeptides, organic acids and others. It is well accepted that the major pharmacological effects of *Gypsophila* species are mainly due to the presence of saponins. In the last years there were several reports on sulfated saponins isolated from *Gypsophila* species. Here we describe the isolation and identification of one new sulfated triterpenoid saponin 3-O-sulfooleanolic acid 28-O\([\alpha\)-glucopyranosyl-(1\(\rightarrow\)3)]\[\alpha\)-glucopyranosyl-(1\(\rightarrow\)6)]\[\alpha\]-glucopyranosyl ester (1) from the roots of *Gypsophila richotoma* Wend. (Caryophyllaceae). Its cytotoxic activity was tested against nine human cancer cell lines. *Gypsophila richotoma* Wend. is a perennial herbaceous plant, growing in Southeast Europe, Southwest Asia, Kazakhstan, West Mongolia, Russia and Turkmenistan. The species is spread in Bulgaria along the Black Sea coast. The roots of *G. richotoma* Wend. (Caryophyllaceae) were collected in August 2008 at the Black Sea coast, Bulgaria. A voucher specimen was deposited at the Herbarium of the Faculty of Biology, Sofia University. NMR (\(\text{H}, \text{HMBC, HSQC, COSY}\) spectra were recorded on a Bruker spectrometer at 700 MHz in C\(_2\)D\(_2\)N. ESI-TOF was carried out on an Agilent 6210 ESI-TOF mass spectrometer. HPLC was run on a Shimadzu HPLC. Separations were achieved on semi-prep. HPLC column C18 using MeOH-0.03% TFA (30 : 70 \(\rightarrow\) 100 : 0, 1 mL min\(^{-1}\), 210 nm). Column chromatography (CC) was carried out with Diaion HP-20 using a gradient of H\(_2\)O-MeOH (100 : 0 \(\rightarrow\) 0 : 100) and silica gel 60 (40-63 µm), eluted with CH\(_2\)Cl\(_2\)-MeOH-H\(_2\)O (18 : 11 : 1). The structure was elucidated on the basis of acid hydrolysis and spectral data including NMR (\(\text{H}, \text{HSQC, HMBC, } \text{^1H-^1H COSY}\) and mass spectra. The cancer cell growth inhibitory activity of compound 1 was evaluated against SKW-3, HL-60, HL-60-DOX, K-562, NB-4, EOL-1, CAL-29, RPMI-8226, U-266 cell lines, using MTT-dye reduction assay. It caused concentration-dependent inhibition of malignant cell proliferation, to all of the cell lines except to HL-60/Dox. The most prominent activity was observed against the CAL-29 cell line.

**Key words:** Gypsophila richotoma, 3-O-Sulfo-triterpenoid saponin, wend.

### 3.56 Application of Muller Polarimetry for analysis of Two Types of Biofilms Made from Gelatin / Starch and Gelatin / Sodium Alginate

Zaher K. Cherif S., Medjahed A., and El Kolli M.

Laboratoire des Matériaux Polymériques Multiphasiques (LMPMP), Département de Génie des Procédés Faculté de Technologie, Laboratory of Applied Optics, Institut of Optics and Precision Mechanics, University of Ferhat Abbas, Setif, Algeria
Abstract: A light wave is characterized by 4 characteristics: its amplitude, its frequency, its phase and the direction of polarization of its luminous vector (the electric field). It is in this last characteristic that we will be interested. The polarization of the light was introduced in order to describe the vectorial behaviour of the light; it describes the way in which the electric field evolves in a point of space. Our work consists in studying biofilms for applications in the pharmaceutical field. When crossing these mediums, the light undergoes modifications and/or deteriorations of its initial state of polarization. This phenomenon is related to the properties of the medium, we illuminate our samples with a He-Ne (632.8 nm) laser. The idea is to compare the characteristics of the entering and outgoing light from the studied mediums. The model selected is that of the matrix of Mueller: it is a transfer matrix which contains all information about the modifications induced by the interaction light-matter. From these matrices, we defined some polarimetric properties of these mediums. The Mueller polarimeter is one of the major types of polarimeters used in measuring polarization properties; it can be viewed as a sample-measuring instrument. In a light polarization model, a sample can be represented by a 4x4 Mueller matrix where all 16 elements are determined. The advantage of this model is that it is accessible in experiments by measurements of intensity realizable with a photodetector. This last information makes it possible to discriminate some physical properties of the studied mediums. The biofilms analyzed by our technique, are made from animal gelatin/Corn starch, animal gelatin/sodium alginate, in the presence of glycerol. The results found show that the presence of glycerol on gelatin/alginate, reduces the transparency of the film. However, the presence of glycerol on gelatin/starch, makes the film transparent. The transparency of biofilm, provides good visual control of cicatrizations wounds.

Key words: Biofilms, gelatine, glycerol light polarization, mueller matrix, sodium alginate, starch.

3.57 Quality Control and Standardization of Essential Oils

ZRIRA Saadia
Département des Sciences Alimentaires et Nutritionnelles, IAV Hassan II, Rabat Instituts, BP 6202, Rabat, Maroc.

Abstract: Occurrence of essential oils or volatile oils is very widespread in the plant kingdom. They are synthesized and accumulated in oil cells, secretion ducts or cavities, or in glandular hairs of plants. Today, according to market data, essential oils are produced on a large scale and commercialized from about 400 species, from 67 species. Essential oils are volatile odorous substances contained in the plants. They are heterogeneous mixture of complexes components whose contents can vary from state of trace to more than 90%. The production and consumption of essential oils, because of their multipurpose applications, are increasing continuously: essential oils are used in perfumery, food industry, households, condiments, beverages, as well as pharmaceutical and aromatherapeutic products from plant origin. The quality of essential depends on several factors such as the species and variety, the plant part, the environment, the harvesting period, the state of the vegetable matter (fresh or dry), the leaves age, the extraction technique and the storage conditions. The standardization of essential is very important to ensure user's safety. Several standards and regulations are organizing the sector. International Organization for Standardization (ISO), provides guidelines for packing, packaging, storage, labeling, sampling, testing of essential oils, they. French Association for Standardization "Association Française de Normalisation (AFNOR), provides guidelines and standards for the members of the European Union to facilitate intra-Community trade. The standards AFNOR allow the characterization of essential oils (physical, organoleptic, chemical and chromatographic characteristics) in order to assess the quality of it. The control of essential oils quality is carried out by determination of physicochemical characteristics and the Gas chromatographic analysis, which makes it possible to know the chemical composition very exactly and to seek possible traces of undesirable products such of the pesticides or added chemicals. A large quantity of raw material is required to extract pure, natural essential oils. For the essential oils to be of true therapeutic value, they should be pure, natural and of the highest quality. To ensure the quality of essential oils, several certifications and labeling have been implemented. The most important are: organic certification and certification implementation AOC lavender from France.
Key words: Analysis, essential oils, quality control, standardization, volatile oils.
4.1 Correlation Between Seed Indices of *Foeniculum vulgare* Under Allelopathic Effects of *Crocus sativus* L.

*Agha Fateme*¹, Sadrabadi Haghighi Reza ², Molafilabi Abdollah ³

¹Seed Science and Technology Department, Islamic Azad University. ²Agronomy and Plant Breeding Department, Islamic Azad University. ³Research Institute of Food Science and Technology, Iran.

Abstract: *Foeniculum vulgare* is a medical plant from Umbellifera (Apiaceae) family that can be used in mixed cropping with *Crocus sativus* L. This is only possible if there is no allelopathy between crops intercropped. To find out the allelopathic possibility of saffron corms on germination indices of *Foeniculum vulgare* an experiment was performed in completely randomized design with four replications and conducted in Seed Science and Technology laboratory in Faculty of Agricultural of Islamic Azad University, Mashhad Branch in 2011. Treatments were five levels of *Crocus sativus* L. corms water extract concentration (0, 25, 50, 75 and 100%). In this experiment, some indices related to the seed vigour including mean time germination (MTG), mean daily germination (MDG), daily germination speed (DGS), coefficient velocity germination (CVG), seedling vigour indices (SVI) and radicle and plumule length measured. Data were analyzed with SPSS software. Also probit analysis was used for studying the seed reaction to different levels of saffron corms water extract concentration. Analysis of variance showed that effects of treatments on all indices were significant, except on CVG. In correlation analysis, a significant relation between all seed vigour indices were observed except for CVG with all other indices. There was a negative correlation between DGS with %G, SVI and MDG. The results indicated the allelopathic effects of saffron corms and showed that by increasing extract concentration all indices decreased dramatically. The results from this study strongly suggest that allelopathy may be a possible mechanism controlling the timing of germination and seed vigour in *Foeniculum vulgare*.

Key words: Allelopathic, *Foeniculum vulgare*, germination, saffron.

4.2 Field Performance of *Vernonia anthelmintica* Under the Agroclimatic Conditions of Mansehra

Ahmad, I., Ahmad, Habib ², Hashmi, Ratooba S ³, Yasmin, A ⁴, Fazal, N ², and Khatoon, M ³.

¹Department of Botany Hazara University Mansehra. ²Department of Genetics Hazara University Mansehra. ³Department of Botany, University of Azad Jammu and Kashmir, Muzaffar Abad ⁴Department of Environmental Sciences, Fatma Jinnah Women University, Rawalpindi, Pakistan.

Abstract: *Vernonia anthelmintica* (L.) Willd, an important medicinal plant newly introduced in Pakistan, was tested for seed yield under the rainfed condition of Pakhal Plateau, Mansehra. Performance of the germplasm was evaluated through sowing methods, seed rate, herbicide application and plant density. The parameters analyzed included plant height, number of leaves per plant, number of branches per plant, leaf area, number of capitula per plant and yield per hectare. Analysis of variance showed highly significant differences for all the yield components. The correlation coefficient indicated that seed yield was highly significant and positive correlated with number of capitula per plant and number of branches per plant, significant and positive correlation with plant height and non-significant positive correlation with leaf size and number of leaves per plant. Similarly seed yield had very strong, highly significant and positive regression with 7.867 and 5.602 regression coefficients for number of capitula and number of branches,
respectively. Weak, positive and significant regression with 5.221 regression coefficient was recorded for plant height. A weak, positive but non-significant regression with 3.858 and 5.602 regression coefficient was recorded for leaf area and number of leaves, respectively. It was also observed that planting method and herbicide application has evident effect on seed yield. It is recommended that for getting maximum yield in the rain fed conditions sowing should be done by broadcast method with herbicide spray before sowing. Agronomic characters like number of capitulum per plant, number of branches per plant and plant height has evident effect on seed yield, and hence these characters must be taken on preference for improvement of *Vernonia anthelmintica*.

**Key words:** Capitula, *Vernonia anthelmintica*, medicinal plant, rainfed, seed yield.

### 4.3 Influence of Water Intervals, Seed Type and Grazing on the Growth Characters of Little Jack Plants

**Aisha M.A. Ahmed**¹ and **Kamal H. Shaltout**²

¹Botany Department, National Research Centre, Dokki, Cairo, Egypt. ²Botany Department, Faculty of Science, Tanta University, Tanta, Egypt.

**Abstract:** The present study was carried out in the experimental farm of faculty of science, Tanta University, Egypt, during two successive seasons (October 1997 - June 1998 and October 1998 - June 1999). The objective of the present study was to investigate the effect of seed type, water regime and partial cutting on the growth and nutritive values of little jack (*Emex spinosa*). The results indicated that: the subterranean seeds gave the highest percentage of seed germination compared with the aerial heavy and light seeds; the plants generated from the subterranean seeds, the plants growing under the wet regime and the uncut plants gave the highest values of most of vegetative characters and the highest percentages of chemical constituents (total carbohydrates, nitrogen, crude protein, phosphorus and potassium.) for all organs at different growth stages. 25 % cut treatment had the highest vegetative characters and chemical constituents for all organs.

**Key words:** Germination, growth, seed type, vegetative, water.

### 4.4 Evaluation of Four Medical Plant Species of *Euphorbia* to Callus Initiation in vitro

**Alijbouri Abedaljasim M.**¹, **Zokian S.A Yakoub**², and **Almusawi, A. H.**²

¹Biotechnology Research Center – Al-Nahrain University –Baghdad- Iraq. ²College of Science- Baghdad University- Iraq.

**Abstract:** Callus cultures of four species of *Euphorbia* were initiated from nodule explants cultured on Murashige and Skoog (MS) medium, supplemented with different concentrations (0, 0.5 ,1, 1.5 and 2 mg/l) of auxin hormone 2,4-Dichlorophenoxy acetic acid (2,4-D). Half of cultures were incubated under light of 16 hr/day, while the other half were incubated under complete darkness. The incubation temperature was 25± 1 ºC in both incubation conditions. The observations on number of nodule explants initiated callus were recorded 2, 4, 6 and 8 weeks of culture. 50 mg of callus produced were re-cultured on MS medium supplemented with different concentrations of 2,4-D (0, 0.4, 0.8, 1.2 and 1.6 mg/l). Callus fresh and dry weights were recorded after 4 weeks. The results showed that nodule explants of *E.peplus* and *E.hirta* incubated in light condition achieved the highest callus initiation (75 – 100%) compared with the other species studied, while *E.helioscopia* incubated in light condition achieved the lowest response for callus initiation which reached 25-75 %. The results also showed significant differences between the *Euphorbia* species in fresh and dry callus weight. *E.hirta* produced the highest weight of fresh and dry callus that reached 1.410 and 0.046 mg, respectively. The amount of fresh and dry weight of callus produced under dark condition was significantly higher than that produced under light condition.

**Key words:** Acetic acid, auxin, callus, *Euphorbia*, nodule, species.
4.5 Formation of Hawthorn, *Crataegus azarolus* L. Plants from Multiplication of Buds In Vitro

Al-Mallah, M.K.¹ and AL-Hadeedy, S.H.²

¹ Forestry Department, College of Agriculture and Forestry. ² Biotechnology Department, College of Education-Mosul, University of Mosul, Iraq.

**Abstract:** The results proved that buds vegetative multiplication that excited from Hawthorn trees produced numerous shoots from single bud by using agar solidified MS medium supplemented with 5.0 mg/L BA, (Benzyl adenine). It was possible to enhance the multiplication rate by adding 0.5 mg/L of Indole Butyric Acid (IBA) to the medium with decreasing concentration of BA to 3.0 mg / L. This medium stimulates the formation of callus that differentiated to new shoots.

**Key words:** *Crataegus azarolus*, hawthorn, in vitro, multiplication.

4.6 Improving Horse Chestnut Multiplication Rates and Embryo Quality

Ćalić Dušica, Devrnja Nina, Milojević Jelena, Tubić Ljiljana, and Zdravković-Korać Snežana

Institute for Biological Research “Siniša Stanković”, University of Belgrade, Despot Stefan Blvd 142, 11 000 Belgrade, Serbia.

**Abstract:** Some of the horse chestnut (*Aesculus hippocastanum* L.) androgenic embryos in microspores and anther culture were abnormal. Addition of abscisic acid in media with horse chestnut androgenic embryos has circumvented the abnormal morphology. The best results were achieved on medium with the lowest abscisic acid concentration (0.01 mg l⁻¹) in microspore culture. The microspore culture proved to be a better model system for albino embryo reduction than anther culture. Also, impact of abscisic acid on secondary somatic embryogenesis was investigated with the aim of improving multiplication rates and somatic embryo quality. With increasing ABA concentration decreased number of secondary somatic embryos of about eight times. Number of secondary somatic embryos was three times higher on hormone-free medium than on medium with the lowest ABA concentration. Secondary somatic embryo production on roots was ten times higher than on cotyledons in both type of culture. Overall, the impact of ABA on induction of secondary somatic embryogenesis and plant regeneration of androgenic embryos of this species may be helpful for further synthesis secondary metabolites in vitro and their applicable in the pharmaceutical industry.

**Key words:** Abscisic acid, embryo morphology, secondary somatic embryogenesis.

4.7 Introduction and Breeding of Wild Growing Medicinal Plants in Central-Europe

Éva Zámboriné -Németh

Corvinus University of Budapest, Department of Medicinal and Aromatic Plants.

**Abstract:** Wild growing plants are widely used in Central Europe based on traditional knowledge. For centuries, the demand has been supplied by collection from wild habitats. However, in the recent 20 years, an accelerated tendency can be observed for introduction several wild growing species into agriculture. It can be traced back to different reasons. The increased demand for high and reliable quantity of raw material as basis of industrial processing can not be covered from natural populations. This is a specifically important question in case of rare and endangered species, where collection would contribute to their extinction. Protected species are only allowed to harvest with special permissions, regulated differently from country to country. In some countries, collection from the wide. The most important stimulating factor for introduction of
wild species into agriculture seems to be however the requirement for standard quality. Efficacy and safety - as basic prerequisites in production of traditional herbal medicinal products in the EU - can only be assured by plant material of known and stable chemical composition. However, the majority of wild growing populations has a wide chemical diversity. Besides, deterioration of drug quality often happens by pollution of the plant raw with pesticides, heavy metals, etc. Their processing and use in up-to-date preparations is only possible if the original raw material is optimized for quality assurance. Obtaining necessary scientific information is an extremely important work especially in case of newly introduced species. Collection and comparison of germplasms, preservation in genebanks contribute to the results. Some good examples show the achievements of these activities, e.g. Verbena officinalis, Solidago virga-aurae, Achillea collina, Symphytum officinale, Primula Veris, Arnica Montana, Rumex crispus. The new genotypes assure sustainable utilization of these species and standard quality of the phyotherapeutical products. The standard quality of biological raw material of medicinal plant preparations gained an increasing significance in the last 20 years. Breeding of medicinal plant species has been accelerated thorough the world. Different tendencies can be observed in this activity. A sever obstacle seems to be the high costs connected to individual laboratory analyses of biologically active principles. Besides, in several cases basic information on floral biology, inheritance and effective methods is still missing. Breeding should be supported by research on these aspects, parallely. At the same time, turnover of investments seems to be restricted due to the relatively small surfaces and seed changes of most medicinal crops. Demand for new varieties arises basically from two directions. Producers require plant material assuring high yields, possessing stress tolerance against different ecological factors, providing morphologically and phenologically uniform stands appropriate for mechanisation, etc. In some countries farmers and merchants cooperate on improvement of these features and try to allocate financial background. In other countries this type of development is basically financed by the state through variable founds whose rate is and efficacy is often not adequate. More frequently, the demand for a uniform and high quality plant material is arising from the side of the processing industry. Traditional herbal medicinal products are not allowed to be registered without a quality assurance system. Starting point of the standard properties of the plant raw material is a selected genotype. For this reason, pharmaceutical factories invest into the development of the plant material of desired quality. As these genotypes are not intended for public marketing, they are often not registered varieties but protected by patents. (The presentation has been supported by TÁMOP 4.2.1.B-09/1/KRM-2010-0005 program).

Key words: Breeding, chemical diversity, Europe, Wild Medicinal Plants.

4.8 In Vitro Propagation and Secondary Metabolites Production in Milk Thistle (Silybum marianum L.)

Fayha M. AL-Hawamdeh 1, Rida A. Shibli 1, and Tamara S. Al-Qudah 2

1 Department of Horticulture and Agronomy, Faculty of Agriculture, 2 Hamdi Mango Center for Scientific Research (HMCSR), University of Jordan, Amman, Jordan

Abstract: Silybum marianum L. is a wild medicinal herbal plant found in Jordan. In the current study, increasing the mass production of this medicinal crop was achieved by in vitro propagation. Micropropagation of S. marianum L. was initiated from seeds. Seeds were surface-sterilized and inoculated on the surface of hormone-free MS media until full germination occurred. MS media supplemented with 0.5 mg/l kinetin and 0.1 mg/l NAA were used for multiplication of mother stock. Proliferation was experimented with different levels (0.0, 0.4, 1.0, 1.6 or 2.0 mg/l) of kinetin, BA, or 2ip. Highest proliferation of S. marianum was obtained when BA and 2ip were used at (2.0 and 0.4 mg/l, respectively). Kinetin gave highest proliferation at 1.6 mg/l. Rooting was experimented at different levels (0.0, 0.4, 1.0, 1.6 or 2.0 mg/l) of IBA, IAA or NAA. Highest root number (4.0) and length (6.14 cm) was achieved at 1.0 mg/l NAA, and no roots were shown on MS media supplemented with IAA and IBA. HPLC analysis was used to identify silymarin components from in vivo grown plants compared with in vitro grown plants. In vitro grown S. marianum on MS medium supplemented with 1.6 mg/l kinetin and 0.1 mg/l NAA gave the highest silymarin content 0.83 % for silybin and 0.49 % for silydianin and compared with those grown on hormone-free MS media 0.35 % for silybin and 0.04 % for silydianin. In vitro grown S. marianum on MS medium supplemented with 2.0 mg/l BA and 0.1 mg/l NAA yielded 0.68 % for silybin and 0.37 % for silydianin.
silydanin (while MS media supplemented with 1.0 mg/l of 2iP gave 0.71% for silybin and 0.27% for silydanin. On the other hand, the in vivo) wild) grown shoots of S. marianum gave 1.07% for silybin and 0.47% for sildyanin. In studying carbon source effect on the in vitro multiplication and silymarin content, glucose gave the highest number (4.4) of shoots and the maximum shoot height (10.6 cm), and the largest amount 1.63% of silymarin content.

Key words: In vitro, metabolites, milk thistle, propagation, Sillybum marianum.

4.9 Effects of Salt Stress (KCl, CaCl₂) on In-Vitro Hyoscyamine Production from Datura Hairy Roots

HARFI Boualem, KHELIFI Lakhdar, KHELIFI-SLAOUI Majda, BEKHOUCHE Mohamed and BENYAMMI Roukia

Laboratoire des Ressources Génétiques et Biotechnologies, Ecole Nationale Supérieure Agronomique (ENSA), 16200 El-Harrach, Algiers, Algeria.

Abstract: Several species of Datura genus are cultivated for their tropane alkaloid contents. However, the hyoscyamine production in open field is limited by the environmental conditions. The culture of hairy roots obtained by inoculation of Datura explants with the Agrobacterium rhizogenes A4 strain offered promising prospects for the in vitro production for this molecule. After the selection of effective root lines, the objective of this study is to optimize the hyoscyamine production by applying of salt stress. Potassium chloride and calcium chloride used as elicitors with various elicitation times reveal significant effects on hyoscyamine biosynthesis. The optimal concentration of KCl is 2 g/l combined with a contact time of 10 hours for the line L_DT and 24 hours for the lines L_DS and L_DI. For CaCl₂, it is 2 g/l for the lines L_DS and L_DT with respectively elicitation times of 10 hours and 24 hours. For the line L_DI, it is with the concentration of 1 g/l and 24 hours elicitation time of CaCl₂, that the most significant result is recorded. The improvement levels of hyoscyamine content compared to the non-elicited controls are respectively 2.32, 1.99 and 1.85 fold for the lines L_DS, L_DT and L_DI elicited with KCl and 2.08, 2.07 and 1.85 fold for L_DS, L_DT and L_DI elicited with CaCl₂. The line resulting from D. tatula elicited with CaCl₂ is most productive in hyoscyamine (16.978 mg/g DW). It is followed by the line of D. innoxia elicited with CaCl₂ then that of D. stramonium elicited with KCl.

Key words: Agrobacterium rhizogenes, Datura, hairy roots, hyoscyamine, salt stress.

4.10 Effects of Chemical Fertilizers on Quantitative and Qualitative Yield of Cumin (Cuminum cyminum L.)

Ghasem Hosein Talaei¹, Majid Amini Dehaghi², Khosro Azizi³

¹Department of Agronomy, Faculty of Agriculture Sciences, Shahed University. ²Medicinal Plants Research Center and Shahed University. ³Agronomy Department, Faculty of Agriculture Sciences, Lorestan University.

Abstract: Cumin is an important medicinal plant and its cultivation in arid and semi-arid parts of Iran which water is a serious constraint to agricultural production has a high economical feasibility. Effects of nitrogen fertilizer in three levels (0, 25, 50 kg.ha⁻¹ from urea) and phosphorous fertilizer in three levels too (0, 40, 80 kg.ha⁻¹ from super phosphat triple) on the yield, yield components and essential oil yield of Cumin was investigated. The experiment was a factorial on the basis of randomized complete block design with three replications conducted at Shaded University, Tehran, Iran in 2010-2011. Results showed that there were significant differences between these two fertilizers for yield, seed yields components, biological yield, essential oil yield, and harvest index (H_I) at 1% level while it was not significant for plant height. Maximum number of umbels per plant, seed per umbel, biological yield, seed yield, harvest index (H_I), 1000 seeds weight and essential oil yield were related to 25 kg of N per ha. Plant height was not affected by N fertilizer significantly. Maximum number of umbels per plant, seed per umbel, biological yield, seed yield, harvest index (H_I), 1000 seeds weight and essential oil yield were related to 50 kg of P per ha.
Plant height was not affected by P fertilizer significantly. There were positive and synergistic interactions between factors like interactions between factors on essential oil yield. The results of this study indicated that application of 25 kg N fertilizer per ha. and 50 kg P per ha. were the most suitable treatments.

**Key words:** Essential oil yield, *Cuminum cyminum*, nitrogen fertilizer, Phosphate fertilizer.

### 4.11 Improvement of Essential Oil Yield and Growth of Japanese mint (*Mentha arvensis* L.) To Exogenous Application of Plant Growth Regulators

**Hashmi R. S**, **Khan N. A**, and **Samiullah**

1Department of Botany, University of Azad jammu & Kashmir (Mzd), Pakistan.

2Department of Botany, Aligarh Muslim University, Aligarh 202002 India

**Abstract:** Japanese mint (*Mentha arvensis*) oil is widely used for pharmaceuticals, agrochemicals and flavoring industries all over the world. Apart from menthol, oil contains many valuable terpenes and other minor constituents. The aim of the work was to test the efficacy of the spray of selected phytohormones to increase the foliage growth and possibly ensure the oil yield of crop, since a large portion of essential oil is extracted from foliage. The pot experiment was carried out on *Mentha arvensis* at department of botany, Aligarh Muslim university, India to study the Individual effect of foliar spray of $10^{-5}$M or $10^{-4}$M of gibberellic acid (GA$_3$), $10^{-6}$M or $10^{-5}$M kinetin (Kn), and deionized water (control test). The best results were obtained with $10^{-5}$M Kn for root length, underground plant fresh weight and dry weight, leaf area, above ground dry matter, leaf and stem dry weight, photosynthetic rate, stomatal conductance, chlorophyll content, photosynthetic water use efficiency and yield parameters. However, plant height, leaf and branch number were maximally affected with $10^{-5}$M GA$_3$. Maximum percent increase for most of the characters was recorded at 105 days after planting (DAP) and $10^{-5}$M Kn was found best concentration in present study. Thus, the spray of $10^{-5}$M Kn may be used for greatest foliage growth, photosynthetic potential and oil yield, and 105 DAP growth stage holds promising potential for essential oil productivity and overall performance of the crop.

**Key words:** Dry matter, essential oil yield, herb yield, Phytohormones *Mentha arvensis*.

### 4.12 Enfluence of Different Organic Fertilization on Productivity and Chemical Components of Two Varieties of Artichoke

**Hendawy, S.F. and Azza, A. Ezz El-Din**

Medicinal and Aromatic Plants Researches Dept. National Research Center, Cairo, Egypt

**Abstract:** Evaluation of growth, yield and active constituents of two varieties of Artichoke (*Cynara cardunculus*) and (*Cynara scolymus*) wild artichoke under different organic fertilization was carried out. Three levels of compost (10, 20 and 30 m3 per feddan (4200 m2) and/or 20 L/fed. of compost tea were arranged in the field experiment during two successive seasons (2010 and 2011). Three cuts have been taken during the growing season. Artichoke (*C.cardunculus*) produced maximum fresh leaves yield when fertilized with 20 m3 of compost + 20 L. of compost tea, while the ideal dose for wild artichoke was 30 m3 of compost + 20 L. of compost tea. The flavonoids percentage in dried leaves ranged from 0.59---0.67 %. Poly-phenols percentage recorded 1.26---1.43 %, where an adverse relation between these two major components was observed.

**Key words:** Artichoke, compost tea, fertilization, leaves, Poly-phenols.
4.13 Organic Cultivation and Use of Medicinal Plants in Latin America

Isabel Maria Madaleno
Portuguese Tropical Research Institute, Rua António Galvão, 2-1B, 2780-047 OEIRAS, Portugal

Abstract: The struggle for health is twice as difficult among the less wealthy, underemployed and unemployed citizens. This contribution examines the organic cultivation of medicinal species in front and backyards and their uses in ten Latin American cities and metropolitan regions. Three main categories of afflictions are analyzed: 1) mild diseases, such as cough, colds, indigestion, conjunctivitis and diarrhea; 2) chronic health problems, meaning asthma, rheumatism; 3) serious troubles, as glaucoma, diabetes and cancer. Ancestral and domestic treatment practices, using native and exotic flora, are listed for each of the researched countries – Brazil, Chile, Argentina, Uruguay, Peru, Mexico, Cuba and Costa Rica – in order to provide a guide for interested peoples.

Key words: Latin America, medicinal plant species, organic cultivation.

4.14 The Effect of Soil Texture and Its Salinity on the Growth and Yield of Roselle

Jasim Abdul razzak A¹ and Al-Kubaisy Waleed M².
¹Ministry of Higher Education And Scientific Research. ²Staff Development Center Foundation of Technical Education, Baghdad - Iraq

Abstract: The experiment was conducted to evaluate the effect of soil texture and its salacity on the growth and yield of Roselle. Three soils texture including silty clay loam, day and sandy silt, and two level of salty soil including 2 and 5 desisemins/m were used in this experiment. Randomized complete block design with three replications were used in this study. The results showed the significant effect on the growth characteristics and yield of Rosette as influenced by soil texture and saline soil. Significant increase in all plant characteristics were attributed to Sandy loam soil and low saline soil as compared with other treatments.

Key words: Effect, growth, salacity, roselle, soil texture.

4.15 Effect of Saline Conditions and Cobalt on Growth and Chemical Constituents of Black Seed Plants

Khalid A. Khalid¹ and Mahmoud R. Shedeed²
¹Medicinal and Aromatic Plants Department, National Research Centre, El Buhouth St., 12311, Dokki, ²Horticulture Department, Faculty of Agriculture, Ain Shams University, 68 Hadayek Shubra, 1124, 1Cairo, Egypt.

Abstract: The effects of saline irrigation water and cobalt on the vegetative growth characters [plant height (cm), leaf number (plant⁻¹), branch number (plant⁻¹), capsule number (plant⁻¹), herb dry weight (plant⁻¹) and seed yield (plant⁻¹)] and content of fixed oil, soluble sugars, proline, NPK and protein of black seed (Nigella sativa L.) plants were investigated. Saline irrigation water decreased certain growth characters, fixed oil, protein and mineral content (NPK) as saline irrigation water level increased. Saline irrigation water promoted the accumulation of soluble sugars and proline contents. The plants treated with saline irrigation water + cobalt resulted in higher plant growth characters and chemical constituent’s values than those treated with saline irrigation water alone.

Key words: Cobalt, fixed oil, growth, NPK, proline, protein, saline irrigation water, soluble sugars.
4.16 Effect of Foliar Application of PRO.SOL Nutrient Solution and Liquorice Extract on Growth and Flowering of Geranium (Pelargonium zonale L.)

Nasser, Z. S and Abbass, J. A
Facility of agriculture – Kufa University – Iraq.

Abstract: The world now avoidance from the use of chemical matters because the negative effects of these chemicals on the environmental, plant and human and resort to use the crude nature matters and plant extracts alternate from it. The Liquorices root extract of Glycyrrhia glabra L plant is one of it, which use in the medicine more than 4000 years in the China as a drug for cold and cough, also many studies and researches indicate that spraying Liquorices root extract on plants improving growth parameters because these root extracts contain many nutrients (N, P, K, Ca, Fe, Zn and Mg), Carbohydrates and Amino acids (Asparagine and Chlino) as well as the active matter of Liquorice root Extract be characterized similar action like GA hormone. because of that an experiment was conducted in the lath house of agriculture college /university of Kufa, to study the effect of foliar application of PRO.SOL nutrient solution and Liquorices root extract on growth parameters of Geranium (Pelargonium zonale L.) cultivar Hans Rigler, included test of three concentration of nutrient solution PRO.SOL i.e. (0,1,1.5)gm.L\(^{-1}\) and three concentration of Liquorices root extract i.e. (0,1.5,3.0)gm.L\(^{-1}\). experiment was conducted as factorial experiment in Randomized Complete Block Design (R.C.B.D) with two factors. Duncan’s Multiple Range test was used at probability of 0.05 to compared means. Results showed that spraying plant with Nutrient Solution of PRO.SOL at concentration of (1.5)gm.L\(^{-1}\) or Liquorice root extract concentration of (3.0) gm.L\(^{-1}\) significantly increased growth parameters (plant height, numbers of total leaves, shoot dry weight, total roots number, roots dry weight, leaf content of total chlorophyll, potassium and iron) in spring season, and number flowers.floret\(^{-1}\) and first flower diameter of the floret and flower content of anthocyanine in autumn and spring season compared to the lowest values which produced from non-spraying plant (control). Results revealed that the interaction between Nutrient Solution of PRO.SOL at concentration of (1.5)gm.L\(^{-1}\) and Liquorice extract concentration of (3.0)gm.L\(^{-1}\) significantly increased plant height, number of total leaves, shoot dry weight, total roots number, roots dry weight and leaf contents of total chlorophyll, potassium and iron in autumn season, and increasing significantly in the number of flowers.floret\(^{-1}\), flower diameter of the first floret and flower content of anthocyanine in the autumn and spring season compared to the lowest values which produced from control treatment.

Key words: Foliar, flowering, geranium, growth, liquorice extract.

4.17 In Vitro Multiplication of Achillea fragrantissima Forssk Sch. Bip

Laila SasiYounes\(^1\), Rida A. Shibli\(^1\), Tamara Said Al-Qudah\(^2\)
\(^1\)Department of Horticulture and Agronomy, Faculty of Agriculture, University of Jordan. \(^2\)Hamdi Mango Center for Scientific Research (HMCSR), University of Jordan, Amman, Jordan.

Abstract: Achillea fragrantissima L. is a wild medicinal herbal plant found in Jordan and neighboring countries. The biodiversity of this plant is heavily subjected to loss because of heavy grazing, land cultivation and collection by people to be used in folk medicine. In the current study, increasing the mass production of this medicinal plant was achieved by in vitro propagation techniques, rooting and acclimatization. Micropropagation of Achillea fragrantissima was initiated from seeds. Seeds were surface-sterilized and cultured on the surface of half-strength, full-strength MS (Murashige and Skoog) medium, or water-agar medium, with or without plant growth regulators (PGRs). Complete germination of seeds (100%) was obtained in water-agar medium and developed into plantlets with greater hypocotyl and root length, and full cotyledonary leaves. Multiplication of mother stock was established on MS (Murashige and Skoog) media supplemented with 1mg/L GA\(_3\) after 4 weeks of culture. Proliferation was experimented with different levels (0.0, 0.4, 0.6, 0.8, 1.2 or 1.6 mg/L) of BA, kinetin or 2ip. Maximum proliferation of Achillea fragrantissima (8 shoots/ explant) was obtained when MS medium supplemented with 1.2 mg/L of kinetin was used. Rooting was experimented at different levels (0.0, 0.4, 0.6, 0.8, 1.2, or 1.6 mg/L) of NAA, IAA or IBA. Highest root number (9.80cm) and length (1.80 cm) was obtained at 0.4 mg/L NAA, while IAA failed to promote root induction. Rooted plantlets were successfully acclimatized with 100% survival.

Key words: Achillea fragrantissima, forssk, in vitro, multiplication.
4.18 Effect of Some Chemical and Biological Fertilizers on Productivity of Medicinal Flax (Linum usitatissimum L.) Plant

Mahmoud Khourang¹, Ghasem Hossein Talaei², Mehdi Rezaei², Parisa Brumand³
¹Department of Horticultural Science, Tarbiat Modares University. ²Department of agriculture, Faculty of Agriculture, Shahed University of Tehran. ³Department of Horticulture, Faculty of Agriculture, University of Tehran, Tehran, IRAN.

Abstract: Flax (Linum usitatissimum L.) is one of the most important of medicinal plants. Today’s products of the flax plant have grown in number and importance, and human consumption of the flax is increasing rapidly for its food and industrial benefits. A diverse variety of biological and chemical fertilizers have been used to increase the quality and quantity of crops yield so far. A field experiment was carried out at the Experimental Station, Faculty of Agriculture, Tarbiat Modares University, during spring season of 2010-2011, to study the effect of some chemical and biological fertilizers containing macro nutrients (i.e 100 kg/ha Urea as the source of N, 100 kg/ha calcium super phosphate as the source of P, 150 kg/ha Potassium sulphate as the source of K and 150 kg/ha N.P.K (10-15-10) containing fertilizer as the source of macro complete fertilizer, combination of 50 kg/ha + 50 ton/ha animal manure and 100 ton/ha animal manure) on yield and its component of a medicinal flax plant. Results showed that fertilizer treatments had significant effects on all of the studied characters with the exception of seed germination date and 4-leaf stage. The earliest and latest flowering date of plants were achieved by applying N.P.K fertilizer and 100 ton/ha animal manure respectively. The highest plant height in full flowering stage obtained by application of 100 ton/ha animal manure. Seeding date of plants was also significantly affected by applied fertilizers; 100 ton/ha animal manure and N.P.K treatment caused latest and earliest seeding date of plant, respectively. The lowest seed index was obtained in control treatment, whereas N.P.K fertilizer caused the highest 1000-seed weight. Seed yield, seed oil percentage and oil yield reached the highest values by adding 150 kg/ha potassium sulphate. Meanwhile oil composition of seed oils was significantly different because of applying various fertilizers, and linoleic acid had the highest amount in all of the tested samples. Protein content of seeds reached the highest value with the application of 100 ton/ha animal manure, while the phosphorus source ranked in the lowest position.

Key words: Biological fertilizers, flax, Linum usitatissimum, medicinal plants.

4.19 The Effects of Corm Harvesting Date and Liquid Fertilizer on Growth and Development of Saffron (Crocus sativus L.)

Majid Amini Dehagi¹, Hossein Amirshekari¹, and Mohammad Ghasem Jami²
¹Associate Professor of Medicinal Plants Research Center and Shahed University. ²M.Sc Student of Agronomy Faculty of Agriculture, University of Shahed, Iran.

Abstract: Saffron as an important medicinal plant has an especial position in human's health and food. Irrigation, date of corm harvesting and suspension spraying are the most effective agents of augmenting Saffron's yield. An experiment was conducted to determine the imperative role of corm’s size and suspension spraying on saffron’s yield. Present research was done in 2008-2009 in the experimental field of Shahed University Research Institute. The corms were picked from 3-year old saffron’s field and then were planted on our experimental farm. Experiment was set out in split plot based on completely randomized block designs with triplicate. The main Factor was in 4 levels including corm harvesting’s date (30Fr, 4 May, 19 May, 7 Sep), on the other hand the adjunct factor contained complete fertilizer in 4 levels of density (control, 5%, 7%, 9%). The complete fertilizer contained (Zn) 5/1%, (K2O) 15%, (P2O5) 8%, (N) 15%. The most important measured traits were: corm number, main corm number, Main corm dry weight, diameter of main corm, Dry weight of small corm of each main corm. According to the final results it turned out that spraying 7% suspension was the best treatment among main factors. On the other case, Dry
weight of leaves and small corms diameter were in their best position through spraying 5% of suspension. The least growth was dedicated to the non-treatment in each characteristic. Furthermore, the highest numbers of small corms in each main corm was harvested through out interaction of forth harvesting, 5 and 7% of suspension spraying and complete fertilizer. However based on economical and environmental conditions, using treatment of 5% is offered. In whole levels of suspension spraying the best date of harvesting was forth harvesting (7 Sep.) considering the main corm’s diameter. Interaction between forth harvesting with non-suspension spraying was offered for increasing main corm’s dry weight. Considering whole measured traits we suggest that Saffron’s farmer use interaction between the forth harvesting treatment (7 Sep.) and 7% suspension spray to achieve the satisfied results.

Key words: Corm harvesting, main corm, saffron, suspension sprayin.

4.20 Effects of Biological (Bio-Stimulators) and Chemical Fertilizers Foliar Application on fenugreek (Trigonella foenum-gracum L.) Under Drought Stress.

Masomeh Mohammdi1, Heshmat Omidi2, Ali Mehrafarin3, and Hasan Ali Naghdi Badi3

1MSc Student, Department of agronomy and plant breeding, Agricultural College, University of Shahed. 2Department of Agronomy and Plant Breeding, Faculty of Agriculture, Shahed university. 3Department of Cultivation and Development, Institute of Medicinal Plants, ACECR, Karaj, Iran.

Abstract: To investigate the effects of drought stress and chemical fertilizer and bio-stimulators on yield and some quantitative characteristics of Trigonella foenum-gracum, a factorial experiment was conducted on the basis of completely randomized blocks design with three replicates in Department of Cultivation and Development, Institute of Medicinal Plants, ACECR in Karaj, Iran in 2011. Treatment included drought stress with levels of non stress (40%FC), average stress (55%FC) and Severe stress (70%FC) and fertilizer with levels control (A), aminolforte (B), Fosnutren (C), kadostim (D), humiforte(E), humiforte+50% (NPK)(F), humiforte+100% (NPK)(G). Results showed that effect of fertilizer ×drought stress was significant (P≤0.01) on parameters of chlorophyl, plant height, petiole length, Root fresh weight, Root dry weight, total seeds fresh weight, total seeds dry weight, seeds thousand weight, the number of seeds per pod. So that was the most chlorophyll, petiole length, number of seeds per pod related to the combination treatment Fosnutren with non stress and most plant height, root dry weight, root fresh weight, seed dry weight related to the combination treatment humiforte+100% (NPK) with severe stress and most seeds fresh weight related to the combination treatment humiforte+100% (NPK) with average stress and most seeds thousand weight related to the combination treatment kadostim with severe stress.

Key words: Biostimulators; chemical fertilizer, drought stress, fenugreek.

4.21 First Results on Germination of Embryos of the Yew Tree (Taxus baccata ssp communis) Collected in Chréa (Algeria)

Morsli A., Ait Abdelkader N., Benassoula F., Benslimani N. and Khelifi L.

Laboratoire de Recherche sur les Ressources génétiques et Biotechnologies (LRGB), Ecole Nationale Supérieure Agronomique (ENSA), El Harrach, Alger, Algeria.

Abstract: The yew tree (Taxus baccata sp communis) is a leading species in medicinal plant. It is producing secondary metabolites of pharmaceutical interest, such as taxol (antimitotic molecule). However, this species does not regenerate itself in Algeria through seeds which are characterised with embryo dormancy. This earned it to the status of endangered species. The valorisation of its metabolite must, therefore, pass through its regeneration and its conservation and multiplication both in situ and ex situ. To do this, it is imperative to lift this embryo dormancy. Indeed, sterile embryos are isolated from freshly harvested seeds and then disinfected and
cultured in vitro. The WHITE and DCR culture media, stages of seed maturity and growing conditions (darkness / light) were tested. The best germination rate (83.33%) is obtained from embryos isolated from bright green seeds, grown on the WHITE culture medium in the dark. The addition of activated charcoal and/or PVP improves significantly the embryo germination quality on the one hand, and prevents culture browning, on the other hand. The seedlings thus obtained constitute a good starting material for taxol producing via biotechnological process or in the open field after the reintegration of the acclimated seedlings in their natural environment.

**Key words:** Embryo germination, in vitro, regeneration, Taxus baccata.

### 4.22 Flavonoid Accumulation in *Hypericum androsaemum* Cell Cultures: Involvement of cAMP

**Paranhos, A.**

_Faculdade de Farmácia and Centro de Estudos Farmacêuticos, Universidade de Coimbra, Azinhaga de Santa Comba, 3000-548 Coimbra, Portugal._

**Abstract:** *Hypericum androsaemum* L. is an herbaceous plant found in damp or shady places throughout Europe and has been used in traditional medicine owing to the diuretic and hepatoprotective properties of its aerial parts. These biological effects are attributed to the diverse flavonoids and phenolic acids known to be present in this species. Cell cultures have been recognized to represent a potential alternative source of secondary plant constituents and also a valuable tool for the study of biosynthetic pathways and regulation of metabolite synthesis. Cell suspension cultures established from hypocotyl-derived callus of *H. androsaemum* were reported to accumulate low amounts of flavonoids, with the highest levels being observed during the stationary phase (day 14). More recently, it was shown that treatment of 11-day-old cultures for 72h with 15 mM CaCl₂ or 5 µM calcium ionophore A23187 increased considerably the accumulation of flavonoids and the activity of phenylalanine ammonia-lyase (PAL), a key regulatory enzyme of phenylpropanoid metabolism assayed. Since calcium and cAMP systems often interact to regulate cell functions, similar experiments were carried out using either 100 µM dibutyryl-cAMP, a membrane-permeable cAMP analogue, or 100 µM IBMX, a cNMP phosphodiesterase inhibitor. Treatments with these modulators of intracellular cAMP also induced a marked increase in both PAL activity and flavonoid content of cells recorded on day 14. On the other hand, the addition of 100 µM 8-Br-cGMP (a membrane-permeable, phosphodiesterase-resistant cGMP analog) had no significant effect on flavonoid production, even though the PAL activity levels were higher than in the untreated cells. In contrast, treatment of cultures with the adenylyl cyclase activator forskolin (20µM) enhanced the accumulation of flavonoids without any significant increase in the levels of PAL activity. Taken together, these findings point to a possible involvement of cAMP signaling in the biosynthesis of flavonoids by *H. androsaemum* cell cultures and also indicate that PAL activity is not always correlated with the accumulation of these compounds.

**Key words:** Cell culture, flavonoid, forskolin, *Hypericum androsaemum*, metabolism.

### 4.23 Growth and Yield of Thyme (*Thymus vulgaris* L) as Influenced by Humic Acid Foliar Spraying and Nitrogen Fertilization

**Saddam Aref Al-Dalain¹, Jawad A. Al-Dala’een², Adel H. Abdel-Ghani³, Haditha A.Thalaen⁴, and Khalil A. Al-Dhala’in⁵**

¹Al-Shoubak University College, Al-Balqa' Applied University, Al-Salt 19117, Jordan. ²Karak University College, Balqa'Applied University, P. O. Box 36 Karak (61151) Jordan. ³Department of Plant Production, Faculty of Agriculture, Mutah University, P.O. Box 7, Karak, Jordan. ⁴Plant Production -Vegetable Farming Since, P.O. Box 4, Karak – Jordan. ⁵Southern Ghour Province Agricultural Directorate- Ministry Of Agriculture, Jordan.
Abstract: Field experiments were conducted during two successive seasons of 2009/2010 and 2010/2011 at a private farm in South Ghor area, Al-Karak, Jordan, to study the effect of humic acid foliar spray with three concentrations 0, 0.1,0, and 200 mg/liter and three levels of nitrogen fertilizer, i.e. 0, 45, and 90 kg/ha pure nitrogen on urea form on Thyme (Thymus vulgaris L.) growth and productivity. Results showed plant height, herbage yield and oil (%) were influenced by foliar spraying of humic acid and with nitrogen fertilizer application and their interaction effects. Foliar spraying of humic acid at 100 and 200 mg/liter and nitrogen application at both doses (45 and 90 kg/ha) resulted in more vigorous plants and significantly increased herbage yield, plant height and essential oil (%) compared to their respective control. More growth and yield were associated with higher humic acid and nitrogen fertilizer treatments. Foliar humic acid application at 100 and 200 mg/liter combined with nitrogen fertilizer application (45 and 90 kg/ha) led to maximize the growth and essential oil (%), although non-significant in most cases.

Key words: Thyme (Thymus vulgaris L.), growth, humic acid, nitrogen fertilization.

4.24 Effect of Magnetic Field on Cardoon (Cynara cardunculus L.) Seedlings

SHARAF-ELDIN Mahmoud1,2, ALGORASHY Assari1, SABRY Refaat3,4, and ELSAYED Ibrahim3

1Sara bint Rached bin Ghonaim research chair for cultivating non-traditional medicinal and aromatic plants, College of Sciences and Humanitarian Studies, Salman bin Abdulaziz University (SAU), P.O. Box 83, 11942 Alkhajr, Kingdom of Saudi Arabia (KSA). 2Department of Medicinal and Aromatic Plants Research, National Research Centre (NRC). 12622-Cairo, Egypt. 3Salman bin Abdulaziz University (SAU), College of Sciences and Humanitarian Studies, Physics Department. PB 83, 11942 Alkhajr, Saudi Arabia. 4International Centre for Advanced Studies in Physical Sciences, Faculty of Physics & Astronomy, Ruhr University Bochum, D-44780 Bochum, Germany.

Abstract: Application of electricity, magnetism, monochrome light, and sound can stimulate the growth of plants to a great extent. This little-known technology, called Electro-culture, can accelerate growth rates, increase yields, and improve crop quality. Electro-culture can protect plants from diseases, insects and frost. These methods also can reduce the requirements for fertilizer or pesticides. Growers can produce greater and better crops in less time, with less effort, and at a lower cost. The energies are applied to the seeds, plants, soil or the water and nutrients. Cardoon plant (Cynara cardunculus L.) would be one of the best plants suits for the reclaimed desert lands in the Kingdom of Saudi Arabia (KSA). Last year in the market the price of the fresh artichoke head was SAR 5.53/0.37g and for processed artichoke receptacle was SAR 11.50/400g. Here we report for the first time the cultivation of cardoon in the KSA in particular at Alkhajr Governorate. A laboratory experiment was carried out during the successive season of 2011/2012 at the premises of the Sara bint Rached bin Ghonaim Research Chair for Cultivating non-Traditional Medicinal and Aromatic plants, SAU, KSA, to study the effect of magnetic field (MF) on cardoon (Cynara cardunculus L.) seedlings. Seeds of Cynara cardunculus L. (Compositae) of German origin were supplied by Jelitto GmbH, Germany. Seventy five mT MF was used as follows: three different MF exposure time were studied as MF1: 15 min., MF2: 30 min. or MF3: 45 min, and MF0: not exposed to MF (control) were studied. We found that magnetic fields (MF) had significant effects on most of agronomic parameters studied. Days to germinate, germination percentage, seedling length (cm), root length (cm), seedling fresh and dry weight (g) influenced with the increase in MF exposure time. Among various MF exposures time (MF2) exhibited the best growth attributes. Additionally, root system was influenced by MF exposure.

Key words: Cardoon, Cynara cardunculus, magnetic field.
4.25 Antioxidants *In Vitro* Androgenic Culture of *Aesculus hippocastanum*

Štajner Dubravka¹, Popović Boris¹, Ćalić Dušica² and Štajner Marijana³

¹Faculty of Agriculture, University of Novi Sad, Trg Dositeja Obradovića 8, 21000 Novi Sad, Serbia.
²Institute for Biological Research "Siniša Stanković" University of Belgrade, Despot Stefan Blvd. 142, 11000 Belgrade, Serbia.
³Emergency Centre, Clinical Centre of Vojvodina, Hajduk Veljkova 1, 21000 Novi Sad, Serbia.

**Abstract:** In vivo antioxidant scavenging activity of leaves and seed embryos, and in vitro androgenic embryos of *Aesculus hippocastanum* was studied. Total antioxidant capacity of all the tested samples of *A. hippocastanum* was determined using FRAP, DPPH, and NO• radical scavenger capacity. Antioxidant enzyme activities of superoxide dismutase, catalase, guaiacol peroxidase and glutathione peroxidase were determined. The leaves of *A. hippocastanum* had stronger antioxidant activity, (higher activities of SOD, higher quantities of GSH, TSH, TP, scavenging abilities of DPPH and NO•, higher FRAP values and lowest quantities of •OH and MDA) than in vitro obtained androgenic embryos. Androgenic embryos of *A. hippocastanum* had low amount of antioxidants due to the controlled environmental conditions we employed (T, photoperiod, humidity, nutritive factors, pathogen-free), and it can be concluded that tissue culture methods produce optimal condition for the growth of androgenic embryos. The optimization of in vitro conditions for mass production of androgenic embryos could improve cultivation techniques, conservation of these species, as well as protection from leaf miners.

**Key words:** Antioxidant, *Aesculus hippocastanum*, androgenic embryo, tissue culture.

4.26 Biotechnological Approaches for Cultivation of *Rh. rosea* - Endangered Medicinal Plant

Tasheva, Krasimira and Kosturkova, Georgina

Plant Growth and Development Regulation Department, Institute of Plant Physiology and Genetics, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria.

**Abstract:** At present more than 50 000 plant species are used in the two major fields: the contemporary phytotherapy and the modern allopathic medicine. Worldwide about 2/3 of those 50 000 medicinal plants are harvested from nature. The share of the cultivated plants used in the pharmaceutical industry is quite small, yet, being only 10 % in Europe. The number of natural populations is decreasing progressively leading to local extinction of many species or degradation of their habitats. Bulgaria is in the leading world positions in export of wild medicinal plants. Annual harvest varies between 15 000 t and 17 000 t. Half of them are collected in the mountains while 80% of them are exported. Bulgarian medicinal plants are famous for their high content of biologically active substances. *Rhodiola rosea* is a medicinal succulent plant with limited area of distribution. The species is protected by Law in Bulgaria and other countries (Romania, Russia, UK etc). Roots and rhizomes contain biological active substances. Extracts from roots and rhizomes are used in prevention and treatment of some social important diseases – neurology, cardio-vascular, oncology etc. The plants need 4-6 years to accumulate the high content of basic/main biologically active substances. The biotechnological tools are important to select, multiply and conserve the critical genotypes of medicinal plants. Some of the most important is the clonal propagation of identically plants in in vitro condition. Plant material from wild growing plants and seeds (selected for high level of salidroside and rosavin complex) were used for initial experiments in vitro. Efficient systems for mass plant propagation and callusogenesis were established. Acclimatization of rooted rodiola plantlets in the greenhouse and in natural conditions was successful up to 70 % and 68 %, respectively. Phytochemical analysis did not prove biologically active substances in the roots of one month old regenerants in test tubes. However, salidroside was detected in the rhizome and roots of one and two year old regenerants grown in the mountains and in the green house.

**Key words:** Biotechnological, cultivation, medicinal plant, mountain, phytotherapy, *rosea*.
5.1 Biological Control of Leaf Spot Disease by A Few South Indian Medicinal Ferns

A. John De Britto
PG & Research Department of Botany, St.Xavier’s College (Autonomous) Palayamkottai – 627 002 Tamil Nadu India

Abstract: Leaf spot is a common disease in agriculture with severe yield loss. This harmful disease is caused by a phyto pathogenic bacteria namely Xanthomonas campestris. It is a multi-antibiotic resistant bacterium. Many vegetable and cash crops are severely affected by the leaf spot disease which is caused by X. campestris. These bacteria have acquired resistance to synthetic pesticides. Pathovars of Xanthomonas are reported to have developed resistance to kanamycin, ampicillin, penicillin and streptomycin. Considering the resistant potency of X. campestris, there is an urgent need for alternative agents for the management of this pathogenic microorganism. Pteridophytes (ferns) are one of the oldest land plant groups on earth and constitute a vast group of vascular cryptograms. Ferns also show medicinal utility and many of them are being used medicinally from ancient time. These plants are resistant to a wide array of pathogens. The rich diversity of Indian medicinal ferns has been evaluated for their antimicrobial properties, and this may have proved beneficial for mankind. All the parts like rhizome, stem, fronds, pinnae and spores contain antimicrobial and medicinal potency due to the presence of secondary metabolites. Hence in the present study biocontrol activity of ten south Indian medicinal ferns on X. campestris was investigated. The antibacterial activity of five solvent extracts of ten medicinal ferns collected from the Western Ghats of south India was checked by agar disc diffusion method on MH agar medium. The methanol extracts of all the ferns gave successful result against the tested bacteria. Phytochemical analysis of all the extracts revealed that antibacterial activity is due to the presence of alkaloids, flavonoids and phenolic compounds. According to the results of MIC (Minimum Inhibitory Concentration) and RPI (Relative Percentage Inhibition) values, ferns extracts could be used as bio control agents for the management of pathogenic bacteria X. campestris.

Key words: Antibacterial activity, leaf spot, pteridophytes, Xanthomonas campestris.

5.2 Activity of Neem (Azadirachta indica a.juss) Extracted (Azadirachtin) on Mosquito Culex Pipiens pipiens (Diptera: Culicidae)

ALOUANI, Abdelouaheb1 REHIMI, N and SOLTANI, N2
1Department of Biological Sciences, University of Ibn Khaldoun – Tiaret. 2Department of Biological Sciences, University of Badji Moukhtar Annaba, Algeria.

Abstract: Various neem products have been researched extensively for their phytochemistry and exploitation in pest control programmes. A number of bioactive components have been isolated from various parts of the neem tree (Azadirachta indica ; Meliacae).These chemical compounds have different designations, among which Azadirachtin is the major component, and the predominant insecticidally active ingredient of seed, leaves, and other parts of the neem tree. Neem components show multiple effects against different insects such as mosquitoes. Azadirachtin (3.2% w/w) was tested for its effects against 1st and 2nd instars larvae of Culex pipiens (Diptera: Culicidae) under laboratory conditions, following the standard World Health Organization insecticide susceptibility methodology. The results have been exploited according to classic statistical methods. A linear correlation was revealed between concentration and larval mortality . At first stage, larval mortality increased from 44.44 % at 0.125 mg /L to 93.05 % at concentration 1mg /L of azadirachtin in direct effect. The median lethal concentration (LC50 ) values was 0, 18 mg / L. Cumulate mortality increased from 54.28% to 95.71% at 0,125mg/L and 1mg/L respectively. The LC50 value for the indirect effect was 0.12 mg/L. At second stage, larval
mortality increased from 39.66 % at 0.125 mg /L to 91.77 % at concentration 1mg /L of azadirachtin in direct effect. The median lethal concentration (LC_{50}) values was 0, 20 mg / L. Cumulate mortality increased from 46.43% to 94.32% at 0.125mg/L and 1mg/L respectively. The LC50 value for the indirect effect was 0.15 mg/L. Treatment resulted in a significant larvicidal effect and an inhibition of adult emergence. Moreover, treatment with azadirachtin caused different types of deformation in the larva, pupa and adult stages of mosquito.

Key words: Azadirachta indica, Culex pipiens pipiens, larvicidal, mortality.

5.3 In vitro Insecticidal Effect of Rosemary (Rosmarinus officinalis) Against the Tomato leaf Miner (Tuta absoluta , Meyrick, 1917)

AMMAD Faiza , BOUTECHENT R., AMADA Farid, and AOUES K.  

1Department of Agronomy, Saad Dahleb University, PB. 270, route de Soumaa Blida, Algeria.

Abstract: The objective of this work has focused on evaluating the insecticidal activity (in vitro) of an essential oil of Rosmarinus officinalis against the larvae of Tuta absoluta. The hydro distillation as a method of extracting the essential oil of the plant tested (Rosemary) and Gaz Phase Chromography (GPC) as a method for separating the complex substance of volatile products and the identification and quantification of chemical compounds, the insecticidal potential of the essential oil was evaluated by adding to 4 different doses (D1 :1ml H E +99ml Tween ,D2 :1.5 ml H E +98.5ml Tween , D3 :2ml H E +98ml Tween ,D4 : 2.5ml H E +97.5 ml Tween ). The application of treatment was on Tuta Larvae (L2et L3) by contact. The control larvae were treated by contact only by Tween 80 (3%), the counting of dead larvae was performed 24 hours, 48 h, 72 h and 96 h after each treatment. Statistical Method was done using: SYSTAT, ver.12 SPSS 2009 and GLM (General Linear Model) and calculation of lethal concentration that produce 50% of mortality. The analytical study of essential oil by (GPC), showed the presence of sixty (16) chemical compounds: Cineole (56.90%) followed respectively by the pinene and camphor (16.75% and 10.17%),α cadinene ( 0.0311%) and others. The essential oil of rosemary used introduced a gradation of insecticide activity against larvae of the tomato leaf-miner by dose and exposure time. The Lethal concentration (LC50) that induces 50% mortality of the study population is 1.6mg/cm3. It is concluded that the essential oil of rosemary has toxic effect by contacting and that substances used have a strong insecticide effect.

Key words: In vitro, Rosemary, Tuta absoluta meyrick.

5.4 Effectiveness of Certain Chemical and Safe Alternative Compounds as a Management Tool of the Cotton Seed Bug Oxycarenus hyalinipennis (Costa) Infesting Okra

Amro, Mohamed A1, and Abd El-Rahim, Gamal H2.  

1Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.  
2Horticulture Department, Faculty of Agriculture, El-Azhar University, Assiut, Egypt.

Abstract: Population fluctuations of the cotton seed bug Oxycarenus hyalinipennis (Costa) was monitored on okra (Abelmoschus spp.) in Assiut governorate, northern Upper Egypt during 2009 and 2010 okra growing seasons. In both seasons the pest showed two peaks. The first peak was recorded in the third week of July, while the second one was recorded in mid August. Gradually increase of the pest numbers was detected before each peak and coincided with the increase of the nymphal stage populations. This could be considered as a prove that O. hyalinipennis may have two generations on okra planted in northern Upper Egypt. The ability of certain chemical and safe alternative compounds in reducing O. hyalinipennis populations in okra dry fruits was determined. The chemical compound Sumithion 50% EC reduces the pest numbers by 92.21%. However, the tested safe alternative compounds had less effectiveness (ranged 37.58% to
80.77%). Although the latter compounds ranked the second, they could be used as a promising tool in suppressing *O. hyalinipennis* infestation on okra dry fruits. First because they had acceptable reduction percentage in the pest numbers. Second, because they had low residual effects. Furthermore, they can be applied more than one time in one okra growing season.

**Key words:** Chemical, costa, *Oxycarenus hyalinipennis*, okra, safe compounds.

### 5.5 Investigation on the Repellency Effect of Three Ethanolic Extract Against *Aphis fabae*

Asiyeh Salari Sabzevara¹,², Kamal A¹, Hakimeh N¹,², and Mandana M¹,²

¹Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman.²Member of Young Researchers Society, Shahid Bahonar Univ. of Kerman, Kerman, Iran.

**Abstract:** To reduce the dependence on the sometimes unwise use of synthetic pesticides in fruit and vegetable plantations, the repellent effect of *Peganum harmala* L. (seed), *Calendula officinalis* L. (seed) and *Melia azedarach* L. (dried fruit) ethanolic extracts on *Aphis fabae* Scopoli were assayed in the laboratory. Dual-choice experiments were conducted on broad bean leaves. Half-part of leaves were sprayed with the ethanolic extracts (5 and 10 mg.mL⁻¹) and other parts were exposed to ethanol (95%). The experiment's results indicate clearly repellency effect of these plant derived chemicals on 1-2- and 3-4-day old nymphal stage of *A. fabae*. Mostly, the same effects were observed on the different ages of the aphid. The highest repellent index (RI) (Ca. 62%) was recorded on 1-2 day old and 3-4 day-old *A. fabae* individuals with *C. officinalis* ethanolic and *P. harmala* seed extract after 72 hours, respectively. The lowest repellent index (RI) (Ca. 30%) was recorded on 3-4 day old individuals with *M. azedarach* extract after 48 hours. At the concentration of 5 mg.mL⁻¹ on the 3-4 day old *A. fabae*, repellency percentages were significantly higher in *P. harmala* than *C. officinalis* and *M. azedarach* treatments after 24 hours. The result indicated that there were significant differences between susceptibility of 1-2 day old and 3-4 day old with *C. officinalis* (5 mg.mL⁻¹) after 24 and 48hours. There were significant differences between the effect of *C. officinalis* 10 and 5mg.mL⁻¹ on 3-4 day old *A.fabae*. Repellency effects of different plant derived chemicals were not significantly different in the different days of the experiment. Therefore, these botanical extract can be applied as a repellent to control this pest.

**Key words:** *Aphis fabae*, bean leaves, *Melia azedarach*, pest.

### 5.6 Investigation of Insecticidal Properties of Extract of *Hypericum perforatum* L. on *Plutella xylostella*, *Tribolium castaneum* and *Callosobruchus maculates*

AskarianzadehA¹,², Hosseinpour M.H²,², Rastegar F²,², Akbari F²,².

¹Medicinal Plants Research Center, Shahed University. ²Plant Protection Department, College of Agricultural Sciences, Shahed University, Tehran, Iran.

**Abstract:** Now days, application of botanical insecticides was considered because of side effects of chemical pesticides such as environmental pollution, poison residue on the crops and resistance of the insects. In this study, insecticidal properties of *Hypericum perforatum* L. was evaluated. For this purpose, efficacy of extract of *H. perforatum* on the feeding indices of *Plutella xylostella* and *Tribolium castaneum* (Herbst.) and on the oviposition detergency of *Callosobruchus maculates* (F.) were tested. Also contact toxicity effect of the extract on *C. maculates* and *P. xylostella* was evaluated and chemical composition of essential oil was identified. Results showed that extract with 5000 ppm concentration was effective on feeding indices of *P. xylostella*, but on *T. castaneum* until 25000 ppm, no effect was observed. Oviposition detergency of the extract with increasing concentration was increased, so that in 20000 ppm significant difference with control was seen. Lethal concentration for 50% mortality (LC₅₀) on the adult of *C. maculates* and third larval instar of *P. xylostella* was 64619.67 and 21731 ppm, respectively. Result of this study suggested that extract of *H. perforatum* could be efficient as a natural insecticide against stored products pests and other agricultural pests.

**Key words:** *Callosobruchus maculates*, *Hypericum perforatum*, mortality, oviposition.
5.7 The use of seaweed extract of Padina pavonica, Sargassum vulgare and Ulva linza as biocide against Penicillium digitatum in the treatment of post-Harvest citrus

Asma Chbani, Hiba Mawlawi, and Rosette Mansour

Abstract: Penicillium digitatum is a plant pathogen. It is a common postharvest fungus disease of citrus called green mold. Aqueous extracts obtained from Padina pavonica, Sargassum vulgare and Ulva linza have no effect on the growth of P. digitatum on Sabouraud. The zones of inhibition shown by the Dichloromethanolic extract from Padina pavonica (12mm) and Sargassum vulgare (13mm) are lower than the zone of the antifungal (14 to 15mm) while the extract from Ulva linza (14.2mm) is practically equivalent. The results of adhesion test showed that aqueous and organic extracts of Sargassum vulgare showed a high index of adherence (17 and 25), while the aqueous extracts and organic of Ulva linza and Padina pavonica presented a low index of adhesion <25. The in vivo test showed that Penicillium digitatum infected 2 oranges on three previously sprayed with aqueous and organic extracts from Padina pavonica. The aqueous extracts from Sargassum vulgare did not prevent infection by the fungus while organic extracts inhibited fungal mycelia growth. Aqueous and organic extracts from Ulva linza showed a physical barrier to the growth of Penicillium digitatum. The dosage of the chemical elements of algae showed a significant amount of Mg, central iron of chlorophyll a, found mainly in green algae that could explain the inhibitory action of extracts of the green alga Ulva linza against Penicillium. The results of our study suggest that smallholders can use extracts of Ulva linza by dipping or spraying oranges just after harvest.

Key words: Antifungal activity, citrus, in vitro in vivo adhesion test, Pavonica Padina, Penicillium digitatum, Sargassum vulgare, Ulva linza.

5.8 Effect of Six Ethanolic Plants Derived Products on the Pre-Imago Two-Spotted Spider Mite

Ashrafju, Mahla1,2, Ahmadi, Kamal1, Purhemati, Amin1,2, and Moshrefi, Mandana1,2
1Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman.
2Member of Young Researchers Society, Shahid Bahonar University of Kerman, Kerman, Iran

Abstract: Two-spotted spider mite, Tetranychus urticae Koch (Acari: Tetranychidae), is one of the most destructive cosmopolitan pests of many plant families. This pest has shown resistance to many synthetic acaricides applied in the field and glasshouse. Consequently, increased global efforts have been undertaken to develop other methods of pest control such as botanical insecticides. The effects of ethanol (95%) and ethanolic extract of six plant species (Aloe vera, Calendula officinalis, Melia azedarach, Peganum harmala, Syzygium aromaticum and Juglans regia) on T. urticae were investigated under laboratory condition. Leaf disks of bean (3.3 cm diameter) were sprayed by ethanol, as negative control, control without spray and plant extracts with 5 mg.mL−1 concentration as treatments. Then new hatched larva were placed on the leaves and surveyed daily. Developmental times and mortalities of each treatment were evaluated until adult emergence. The susceptibility of each developmental stage was fluctuated by each plant extract. Among the applied plant derived chemicals, the most total mortality was recorded in M. azedarach (87.5%) and P. harmala (81.25%) treatments. Moreover, larval developmental time of the spider mite significantly increased in the both above-mention extracts.

Key words: Developmental times, mortality, Plant extracts, Tetranychus urticae.
5.9 Evaluation of the efficiency of a Formulated Biopesticide Based Essential Oil Thyme on the Larvae Tomato Leafminer (*Tuta absoluta* meyrick), Compared to a Synthetic Insecticide (Thiamethoxam)


1Université Saad Dahleb, Faculté des Sciences Agro-Vétérinaires, Département d’Agronomie, B.P. 270, route de Soumaa Blida, Algérie. 2Ministère de l’Agriculture et du Développement Rural, Direction de la Protection des Végétaux et Contrôle Technique, 12, Avenue Colonel Amrouche. Alger, 3Université Ibn Khaldoun, BP 78 Tiaret.

**Abstract**: Currently, aromatic plants have a considerable advantage thanks to the discovery of applications from their essential oils in the biological fight against pests. The study focused on evaluating the efficacy of a biopesticide formulated: an essential oil of thyme on the larvae of the tomato leafminer (*Tuta absoluta* Meyrick), compared with a synthetic insecticide (Thiamethoxam). The different doses applied during treatment shows that the full dose (D) of biopesticide essential oil of thyme proved the most effective compared to other doses and applied at the registered rate (HR) of the plant protection product due to its low residual populations recorded (PR <28.5%). The interaction of doses and times after treatment reveals an incremental effectiveness over time from the average toxicity to toxicity. For two products namely biological or chemical, the period of 72 hours after treatment is estimated as the best time to obtain an optimal toxicity on the larvae of *Tuta absoluta*.

**Key words**: Aromatic plants, essential oil, phytopesticides, thyme, *Tuta absoluta*.

5.10 Influence of Four Plant Extract on the Oviposition Deterrent Activity of Cow Pea Beetles

**Baniadami, Yekta**1,2 and **Ahmadi, Kamal**1

1Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, Kerman. 2Member of Young Researchers Society, Shahid Bahonar University of Kerman, Kerman, Iran

**Abstract**: *Callosobruchus maculatus* is a serious pest of leguminous seeds. The larvae of many bruchid beetles can make no choices. They must feed, grow and mature in a bean that was selected for them by their mother. Application of chemical insecticides and fumigants is not advisable as seeds are used for consumption. The use of botanical products in controlling insect pests is considered to be the most viable and environmentally safe approach to offset ever increasing danger caused by synthetic pesticides. In the present investigation, the Anti-oviposition effect of crude ethanolic extracts from four plants viz., *Calendula officinalis* (seeds), *Melia azedarach* (dried fruits), *Peganum harmala* (seeds), *Syzygium aromaticum* (dried flower buds) were evaluated against *C. maculatus* using micro-pipette topical test. Special leguminous products (Yellow-Split-Pea) were treated by the extracts (10, 20 and 40 mg.mL–1) and distilled water as treatment and control, respectively. The seeds infested by the fertile *C. maculatus* females were collected from the laboratory colony. After 10 days, number of eggs laid on treated seeds and control seeds were recorded and the percentage of oviposition deterrence was calculated. All these plant extracts showed above 53% oviposition deterrent activity even at lower concentration. The maximum oviposition deterrent activity was calculated in *M. azedarach* treatment (86.47%) at the used maximum concentration.

**Key words**: *Callosobruchus maculatus*, plant extracts, oviposition deterrent.
5.11 Antioxidant and Antifeedant Activities of *Origanum glandulosum* Desf. Acetone Extract

Belhattab Rachid\(^1\) and Azucena Gonzalez- Coloma\(^2\)

\(^1\)Biochemistry Department Faculty of Nature and Life Sciences, University Ferhat Abbas- Setif 19000, Setif, Algeria. \(^2\)ICA, CSIC, 28006, Madrid, Spain.

**Abstract:** *Origanum glandulosum* Desf an endemic species growing wild in Algeria belongs to the Lamiaceae family. The plant is largely used as a beverage and also as source of medicines to cure several pains such as rheumatism, cough and digestive disorders. Acetone extract of the crushed aerial parts of the plant was obtained using a Soxhlet apparatus. Total phenolic content determined spectrophotometrically according to Folin-Ciocalteu method in terms of cafeic acid equivalent was 100.6 mg/100ml extract (38.7%w/w). The radical scavenging activity evaluated by the DPPH test afforded 76.0% when compared to cafeic acid (100%), whereas the antifeedant assay was assessed on three insects *Spodoptora littoralis* Boisd. (Lep:Noctuidae), *Myzus persicae* and *Ropalosiphum podi* fifth instar larvae. The amounts of plant consumed have been recorded for *S.littoralis* as well as the number of insects (*Myzus persicae* and *Ropalosiphum podi*) settled on each leaf disk.

**Key words:** Acetone extract, antifeedant, antifungal, insects, *Origanum glandulosum*.

5.12 Effects of Wild Rose (*Rosa sp.*) Crude Seed Extracts on Legume Aphids

Ben Cheikh-Affene Zohra\(^1\), Chaieb Ikbal\(^2\), Haouala Faouzi\(^3\) and Harzallah-Skhiri Fethia\(^4\)

\(^1\)Department of Horticultural Science and Landscape, Higher Agronomic Institute, University of Sousse. \(^2\)Laboratory of Entomology, Regional Centre of Recherche in Horticultural and Organic Agriculture. \(^3\)Department of Agronomy and Plant Biotechnology, National Institute of Agronomy of Tunisia, University of Carthage. \(^4\)Laboratory of Genetic, Biodiversity and Valorisation of Bioresources, Higher Institute of Biotechnology, University of Monastir. Tunisia.

**Abstract:** Crude hexane seed extracts of four wild species of roses of Caninae Section: *Rosa canina* L., *Rosa dumetorum* Thuiller., *Rosa pomifera* Herm. and *Rosa rubiginosa* L. were screened for their insecticidal activity on two aphid species: black bean aphid (*Aphis fabae* Scop.) and pea aphid (*Acyrthosiphon pisum* Scop.), feed on several cultivated species. Tests were conducted using *in vitro* spraying of each rose seed extract at four doses: 0, 10, 20 and 40 mg ml\(^{-1}\). Results showed a bigger sensitivity of *Aphis fabae* to rose extracts. Indeed, at the dosis of 40 mg ml\(^{-1}\), the mortality varied from 25 to 47% for *Aphis fabae* and from 22 to 34% for *Acyrthosiphon pisum*. The maximum of mortality for the two aphid species was observed with hexane extracts of *R. Dumetorum*. This insecticidal activity may be due to the presence of unsaturated fatty acids in the tested extracts.

**Key words:** *Rosa canina*, *Rosa dumetorum*, *Rosa pomifera*, *Rosa rubiginosa*, seeds, *Aphis fabae*.

5.13 The Insecticidal Effect of Some Medicinal Plants Extracts From the South-West of Algeria

Boulenouar Noureddine\(^1,2\), Cheriti Abdelkrim\(^1\) and Belboukhari Nasser\(^2\)

\(^1\)Phytochemistry & Organic Synthesis Laboratory, Bechar University. \(^2\)Laboratory of Bioactive Molecules and Chiral Separation, Bechar University, Bechar 08000, Algeria.

**Abstract:** *Blatella germanica* is one of the insect species that cause lot of problems for the society. The existing treatments for this species are chemicals known as harmful for the environment. In addition, this species is known for its resistance to many products. The purpose of our study is the use of medicinal plants as source of bioinsecticide. In this study, the insecticidal effect of extracts from four medicinal and/or poisonous plants from the South-West of Algeria: *Nerium oleander*, *Limoniastrum feei*, *Fredolia aretioides* and *Calotropis procera* (two parts from each plants) was evaluated against *Blatella germanica*. Aqueous extracts were obtained by extraction with heat reflux procedure. Two supports were used to carry out the tests (nutritive
support: wafer, non nutritive support: sawdust). For the tests with nutritive support the concentrated extract and four dilution were evaluated (1/2, 1/4, 1/6, 1/8). For the non nutritive support, a quantity of 1g for 4ml of each concentrated extract was tested. A coupling between the extracts was carried out to evaluate the effect of synergy. The tests were realized on adult insects. Concerning the first support, the results did not show any insecticidal effect. Some extracts especially from toxic plants showed death rates between 20 and 80% by using the sawdust. The coupling of the extracts did not increase the insecticidal effect. This study has demonstrated that the extracts of certain plants contain bioactive substances which can be used as source of bio-insecticide against *Blattella germanica*.

**Key words**: Bio-insecticide, *Blattella germanica*, medicinal plants, poisonous plants, sawdust.

### 5.14 Digestive Tract Histological Disorder of L5 Locust *Schistocerca gregaria* (Orthoptera, Cyrtacanthacridinae) After Ingestion of *Peganum harmala* L. (Zygophyllaceae)

**Bounaceur F.,** 1 **Milat-Bissaad F.Z.,** 2 **Outtar F.** 3 and **Doumandji Mitiche-B.** 3

1 Faculty of Natural Sciences and Life, University Ibn Khaldoun. Tiaret. 2 Department of Biology, Faculty of Science, University of Boumerdes M'Hamed Bouguera. 3 National School of Agronomy ENSA, Department of Agricultural and Forest Zoology ENASA, Algeria.

**Abstract**: The *Peganum harmala* L. is known for its traditional use, the seeds have long been used as macrotis, anthelmintics, antispasmodic and in some cases against rheumatism and asthma. In the present work, we tested the effect of this plant on the gut histology of the 5th nymphal instar of the desert locust. Because, is insect since consumes this plant despite that it be toxic. As the result, there was significant histological disorder in the digestive tract of the treated insect compared to the control. Such disorders were manifested mainly in the midgut. However there was no similar disorder observed in the foregut and hindgut of the treated insects. The present results revealed the effectiveness of the *Peganum harmala* against the desert locust in causing detrimental histological disorders in its mesenteron.

**Keywords**: *Peganum harmala*, *Schistocerca gregaria* haemolymph.

### 5.15 Preliminary Study of the Effects of Rootstocks and Viroids on the Essential Oil Composition of the Sweet Orange “The Maltaise Demi Sanguine”

**Chammem Nadia** 1, **Najar Asma** 2, **Sifaoui Ines** 3, **Jribi Chokri** 3, and **Ben Abderrabba Manef** 3

1 Institut National des Sciences Appliquées et de Technologie (INSAT), Centre urbain Nord. B.P. 676, 1080 Tunis, Tunisie. 2 Laboratoire de protection des végétaux, Institut National de la Recherche Agronomique de Tunisie, Rue Hedi Karray, 2049 Ariana, Tunisie. 3 Institut Préparatoire aux Etudes Scientifiques et Techniques (IPEST) B.P. 51, 2070 La Marsa, Tunisie.

**Abstract**: Besides tolerance against diseases, the use of rootstocks in citrus crops may be enhanced by studying some other important aspects like extraction and analysis of essential oils (E.O) that are more and more required as active biomolecules. The presence of E.O in the different tree organs may be influenced by factors affecting the plant status. In the present work, this influence has been studied in relation with viroid infection and the root stock species in the case of Tunisian Maltaise cultivar that was grafted on *Citrumelo swingle* and *Citrus macrophylla* and inoculated with exocortis and cachexia viroids. The analysis of terpenic composition of those E.O in the fruit exocarps showed that (i) Maltaise/Citrumelo swingle association of trees infected by exocortis gave two folds less of terpinen-4-ol and terpineol than the control. At the qualitative level, exocortis infection in this case induced biosynthesis of new molecules e.g. n-decanal, cis-
carveol and δ-selinene, but inhibited others e.g. valencene. (ii) In the case of Maltaise/ Citrumelo macrophylla, cachexia reduced three times the quantity of limonene and nootkatone than exocortis and (iii) Maltaise/ Citrumelo swingle contained five folds more of linalol and two folds more of terpinen-4-ol and terpineol, than Maltaise/ Citrus macrophylla.

**Keywords:** Cachexia, essential oils, exocortis, maltaise, rootstocks.

### 5.16 Repellence and Anti-Oviposition Activities of Plant Products on Greenhouse Whitefly

**Dehghani, Mahsa¹,², and Ahmadi, Kamal¹**

¹Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman.
²Member of Young Researchers Society, Shahid Bahonar University of Kerman, Kerman, Iran.

**Abstract:** The greenhouse whitefly, *Trialeurodes vaporariorum* Westwood (Homoptera: Aleyrodidae), is an important cosmopolitan pest of many crops. Chemical control for the management of greenhouse whitefly has resulted in development of resistance and outbreak of population. So, Secondary metabolites of some plants have been successfully used for integrated control of the pests. The present study investigated the repellent and anti-oviposition activities of essential oils and aqueous extracts from *Achillea millefolium* and *Thymus vulgaris* against this pest in greenhouse condition. The cucumber plants with 5 fully expanded leaves were sprayed with the chemicals at 40 µl/ml concentration and control plants were treated with distilled water. Also, the essential oil of *A. millefolium* at the same volume (5 ml) (for avoid the phytotoxicity effect on the cucumber plant) were sprayed on the special filter paper (2×4 cm) attached at the petiole plant. Four treated plants with the plant derived chemical and four control plants were placed randomly in to a cage (60 × 60 × 80 cm). Three days after spraying with the plant products, approximately 250 whitefly adults were released into the cages. Then three and six days after infesting with the greenhouse whitefly, the number of eggs and adults on detached cucumber leaf were recorded. Each experiment was repeated two times at the same greenhouse condition. The results revealed that all plant products affected on the oviposition and tropism behaviors of greenhouse whitefly. Among different treatments, the highest anti-oviposition effect was calculated by aqueous extracts of *T. vulgaris* (62.87%) six days after treatments. After 9 days, the anti-oviposition effect caused by all the chemicals ranged from 41.80% to 49.33% in aqueous extract and essential oil of *A. millefolium*, respectively. Moreover, the aqueous extract of *A. millefolium* had highest repellent effect (52.54%) six days after treatments. Also, to compare repellent effect of the chemicals on greenhouse whitefly, the highest repellent effect observed with the essential oil of *A. millefolium* (48.07%) nine days after treatments. These results showed that *A. millefolium* and *Thymus vulgaris* had relatively long lasting repellent and anti-oviposition activities on the adults of the greenhouse whitefly.

**Key words:** *Achillea millefolium*, anti-oviposition activities, greenhouse whitefly, *Thymus vulgaris*.

### 5.17 Insecticidal Activities of Five Plant Derived Chemicals on *Thrips tabaci* Lindeman

**Hakimeh Najmizadeh¹,², Kamal Ahmadi¹, and Asieh salari¹,²**

¹Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman.
²Member of Young Researchers Society, Shahid Bahonar University of Kerman, Kerman, Iran.

**Abstract:** Natural compounds originating from plants might be potential alternative pesticide that are not persistent in the environment and are safe to non-target organisms and human for use in sustainable agriculture. During this project, Ethanolic extracts (30 µl mL⁻¹) of *Melia azedarach* L. (Fruits), *Peganum harmala* L. (seeds), *Calendula officinalis* L. (seeds), *Ferula assafoetida* L. (Resin) and *Cercis siliquastrum* L. (seeds) were applied against 1-2 and 5-6 day old of *Thrips tabaci* Lindeman. All the experiments were conducted by spray test bioassay in laboratory and ethanol (95%) was used as control treatments. The results indicated that all the used plant derived
chemicals was highly toxic against the pre-imago thrips. The mortality percentage of the thrips (1-2-day old) after 72h was more than 90% in the ethanolic extract *M. azedarach* and *P. harmala* treatments. It was approximately 89% and 77% in the ethanolic extract of *C. siliquastrum* and *C. officinalis*, respectively. Moreover, the mortality percentage of the pest (5-6-day old) after 72 h was more than 73% in each of the plant extracts. The highest insecticidal activity against the above-mentioned pre-imago thrips was recorded in *F. assafoetida* treatment (80.70%). The results could be concluded that these plant derived chemicals may be applicable as a safe insecticide in *T. tabaci* management programs.

**Key words:** Bioassay, chemicals, insecticidal activities, *Thrips tabaci*.

### 5.18 Assay for Biocontrol of Verticillium Wilt of Olive Trees (Olea eurepea) by Using Actinomycetes Strains

**Harir Mohamed, Belahcen Miloud, and Fortas Zohra**

*Laboratory of biology of microorganisms and biotechnology; Faculty of sciences department of biotechnology university of Es Senia Oran Algeria.*

**Abstract:** The diseases phytopathogenes are responsible for the enormous economic losses, of which 70% are caused by fungus. To limit the damage caused by these diseases, the researchers employed various means of fight. Among these means, the chemical fight was the most used method. However, the exaggerated use of the chemicals leads to harmful side effects as much for the plant that for its environment. Thus the biological fight proved to be the means of the most respectful fight for the environment. From the grounds rhizospheric of the orchards of olive-tree of the Algerian west and arid sols of the Algerian south we isolated 188 stocks from actinomycetes showing different morphological characteristics. The tests of antagonistic activity of the isolates of actinomycetes by various methods enabled us to select 05 isolates, named A48, B14, ST1, T4 and T6, presenting considerable antagonist activity with respect to *V. dahliae*. A traditional taxonomic study was first of all undertaken on the basis of morphological characters. This study made it possible to show that 04 isolate on the other hand produce chains characteristic of the *Streptomyces* kind the characteristics of A48 isolate made it possible to classify it with the *Nocardia* kind. The selected isolates were the subject of kinetics of growth and of production of antibiotics in two test and culture media were then carried out on *V. dahliae*. The results of this test showed an activity much more important of A48 isolate compared to the other isolates, with the maximum ones of production of antibiotics to the 8th and the 15th day of incubation. The best solvent of extraction is the ethyl acetate or N-butanol. The CCM of the rough extract of filtrate of culture of A48 isolate on liquid ISP2 showed the presence of one 05 bands. We supposed that these antibiotics can be attached to the group of aromatic glycosylés. The application in vivo as of these isolate showed an important degree of protection of the tomato screw plants - with - verticilliose, of which the percentages vary between (42.16% and 61.44%).

**Key words:** Actinomycetes, Rhizosphere, Tomato, *V. dahliae*, antagonism.

### 5.19 Biological Control of Fusarium Root Rot Disease on Strawberry Plant

**Huda Hazim Al-Taae**

*Plant Protection Dept. College of Agric. & Forestry Mosul Univ.Iraq.*

**Abstract:** The results of field survey which was conducted in greenhouses subsidiaries (the Plant Protection Department, Department of Horticulture and Nineveh plant cultivation) in the province of Nineveh- Iraq presence of many pathogens, especially fungal infect strawberry plants, and most frequently with the pathogenic fungus *Fusarium solani*, followed by *Fusarium oxysporium* in three houses plastic mentioned. The incidence varied in Fusarium root rot in field survey of the three sites were the highest in the greenhouse of the plant cultivation by of Nineveh 65%. And that this study is the first study of the most important diseases of strawberry, In the test of effect several pesticides in the fungal diameter growth of *F.solani* In vitro. noted that the concentration of (100 mg active ingredient / 1 L) was sufficient to inhibit growth, except fungicide Tobasin was not effective in inhibiting growth of pathogenic fungus, where the percentage of
inhibition 95%. In the duration of bio-test to many biocides fungal and bacterial in diameter growth of *F.solani* In vitro. superiority Bio-resistant contain the active ingredient represented (T.V) *Trichoderma viride*, while there was no significant difference between bacterial biocides in the percentage of inhibition growth of pathogenic fungus. Test showed the effect of several biocides containing bacterial and fungal in the control of Fusarium root rot disease, in the greenhouse of the Plant Protection Department, observed a difference in the rate and severity infect of strawberry plants. the biocide containing active ingredient Trichoderma viride superiority than the other Biocides used in reducing the severity of infection, did not differ significantly from biocide containing the active ingredient *Psudo fluorescens*. Through this study the impact of biocides on several characters for strawberry plants did not differ biocides fungal and bacterial among themselves in terms of their impact on the green matter (chlorophyll) in the leaves of strawberry. Excelled Biocides vitality contain active ingredient, *Bacillus thuringensis*, *Bacillus subtilis* and *Psudo fluorescens* of the leaf space percentage, and the superiority of biocide contain the active ingredient *Bacillus subtilis* in the length of strawberry plants root by treatment. There was no significant difference between all the biocides used in stem diameter of strawberry plants.

**Key words:** Diameter growth, fusarium root, pathogenic fungus, strawberry survey.

### 5.20 Effect of NSKE Under Field Condition Against *Paracoccus marginatus* (Hemiptera: Pseudococcidae) on *Gossypium hirsutum* at Different Agro Climatic Region of Tirunelveli District.

**Kanagarajan Prasanna Kumar and S.R.S, Selvakuthalingam**  
*RVS-Krishi Vigyan Kendra, ICAR Farm Extension Centre, Govt of India, Tirunelveli District*

**Abstract:** Cotton, (*Gossypium hirsutum* L.) plays a pivotal position in fruiting parts but also encourages the development of black the economic development of many countries including sooty mould leading to significant reduction in yield due to various hemipteran pests. Recent outbreak of Mealy bug caused 12% of the total production in Tirunelveli District. As a result a Field study was carried out during Kharif 2010-11 under on form testing programme (OFT) to evaluate the efficacy of NSKE at field recommended doses 1.5 and 3.0% concentrations against cotton mealybug, *Paracoccus marginatus* on cotton at different climatic regions of Tirunelveli District. The result reveals that at 3.0% concentration there is significantly reduced the population of mealybug (60.23%) were noted and significant mortality occurs when concentration increased and the viability remains effective more than 72 hours time durations. Effective dosage of NSKE gives considerable mortality of Mealy bug and a noval Eco friendly approach in Pest and diseases Management.

**Key wards:** Cotton mealybug, *Gossypium hirsutum*, insecticides, NSKE.

### 5.21 Antifungal Activity of Some *Anvillea radiata* Extracts Against *Fusarium oxysporum* F.SP. *Albedinis*

**Mebariki lakhdar and Kaid harch meriem**  
*Laboratory of plant and microbial productions and valuations, University of Science and Technology of Oran Mohamed Boudiaf, Algeria.*

**Abstract:** The date palm is for the people of the Sahara the tree of Providence that provides not only dates, rich food for humans and animals, but also a large number of different productions that are very helpful to the families of phoeniciculteurs. The date palm is also the backbone of the oases which are true islands of greenery and life in the desert. In fact, the recovery provided by its foliage creates a climate conducive to human life, their cultures and their livestock. The association of various cultures and livestock production allow not only for subsistence and self supply but also cash. However, this culture has continued to decrease in the Maghreb as a result of the attack by a lethal vascular wilt called "Bayoud" and caused by *Fusarium oxysporum* f.sp.
albedinis. This disease appeared in Morocco before 1870, in the Draa Valley and during a century it has reached all Moroccan palm groves in destroying more than 12 million trees, then it increased in Algeria where it has invaded the palm of West and Centre by eradicating about 3 million trees the Bayoud continues to eradicate annually from 4.5 to 12% of palm groves. The idea of using natural products against the plant pathogens is becoming increasingly popular because their side effects are negligible and often the desired effect can be achieved by them. With this in mind, we have tried to study the action of some plant extracts on the development of this agent Fusarium. Within this framework, extracts of Anvillea radiata, a medicinal plant belonging to the Asteraceae family which is harvested in the region of Bechar south western Algeria, were tested on germination, mycelial growth, sporulation and the density of Fusarium oxysporum f.sp. albedinis in soil under laboratory conditions. The results show that no inhibition was observed against germination, in contrast, an inhibitory effect was proven by the flavonoids. So, pectins and hemicellulosic extracts showed a suppression of sporogenesis, and a density reduction of Fusarium in soil was observed in the presence of extracts compared to control. These results are encouraging, which suggest the in vivo application of these extracts can be good alternatives to chemical pesticides because they are readily biodegradable in nature.

Key words: Antifungal, Anvillea radiata, botanical extracts, Fusarium oxysporum f.sp. Albedinis.

5.22 Study the Effect of Some Water Extracts of In Killing of the Two Insects Trogoderma granarium Everts and Oryzaephilus surinamensis (L.)

Nada S. Othman


Abstract: This research was conducted to study the effect of some water plant extracts of leaves of the plants, Myrtle Myrtus communis L., Rue Ruta graveolens L., Rosemary Rosemarinus officinalis, Basil Ocimum basilicum and Mint Mentha piperita L. with the concentrations 1, 4, 7, 9 % in calculating the death rates of Trogoderma granarium Everts. and the adults of Oryzaephilus surinamensis (L.). It was found that the concentrations 7% and 9% of M. communis and the concentration 9% of R. graveolens resulted in the highest average death rates for the larvae of T. granarium which was 100%. The concentration 7% of R. graveolens extracts and 9% of M. piperita gave high death averages to be 96.67 and 93.33% respectively. The relative average for R. graveolens 10.00 and 2.28 for M. communis. The insect T. granarium recorded the concentrations 7% and 9% for the extracts of M. communis, R. graveolens and M. piperita with high death average rates to be 100%. M. piperita gave the highest efficiency rate which was 8.83, while the extracts of R. officinalis recorded a low death rate to be 1.00 % for each of the two insects.

Key words: Killing, Trogoderma granarium, Oryzaephilus surinamensis, water extracts.

5.23 Effects of Methanolic Extract of Peganum harmala l. on Different Aphid Species

Salari Elham1,2, Ahmadi Kamal 1, and Zamani Dehyaghobi Reza 1,2

1Department of Plant Protection, College of Agriculture, Shahid Bahonar University, Kerman, Iran., 2Member of Young Researchers Society, Shahid Bahonar University of Kerman, Iran.

Abstract: Aphids are noxious pests of greenhouse and field crops. Botanical derived chemicals as insecticides are less toxic for the human and other biological system in environment. Therefore, it could be required to investigate the possible use of botanical products as alternatives to synthetic insecticides for pest management of aphids. In order to determine the lethal effect of the methanol seed extracts of Peganum harmala L. (Zygophyllaceae) on different aphids, the relative susceptibility of 3-4-day old individuals of the three aphid species were selected as the biotest. The insects included were Aphis fabae Scopoli, Aphis gossypii Glover and Myzus persicae.
(Sulzer). All experiments were conducted by topical test bioassay and the distilled water was used as control. Experiments were carried out at 25±1°C temperature, relative humidity of 60±10% and 16 hours of artificial light at an intensity of about 4000 lux. At the single rate of the plant extract (60 mg.mL⁻¹), after 72 h, the mean mortality percentage of A. gossypii treatments was 90.00% and it was the highest, while the mean mortality was 75.00% in the A. fabae treatments. The mortality was significantly higher in A. gossypii than in A. fabae treatments through the experiment. The highest and the least mortality of M. persicae treatments were 84.00% and 77.00% after 72 and 12 hours, respectively. Also, the toxicity index (LC₅₀) of the methanol seed extracts of P. harmala for A. gossypii and M. persicae after 24 hours were calculated 7.49 and 36.40 mg.mL⁻¹, respectively.

Key words: Aphid Species, methanolic extract, Peganum harmala.

5.24 Management of Bromus tectorum and Melilotus indica through Allelopathic effect of Retama retam (Forssk) Webb & Berthel

Salhi Nesrine¹, Salama M. El-Darier² and Halilat M.El-Taher¹

¹Laboratory for Bioressources Saharan preservation and development, University of Kasdi Merbah, Ouargla, Algeria B P 511 route de Ghardaia 30000. ²Departments of Botany, Faculty of Science, University of Alexandria, Alexandria, Egypt.

Abstract: The present work was carried out as a preliminarily study to investigate any possible herbicidal activity of the selected species against widely spread weed. The allelopathic effect of 2.5, 5.75 and 10% aqueous extract beside the control from aerial shoots of Retama retam, (donor species) was clearly demonstrated on germination percentage, plumule and radicle length of two weeds (Bromus tectorum and Melilotus indica) and one crop species (Triticum aestivum). Considering the foregoing results, it seemed that there are significant phytotoxic effect of Retama retam on germination and plumule and radicle length. The germination percentage (GP), plumule (PL) and radicle length (RL) were recorded after one weak at the end of the experiment. The data of the present study were subjected to standard one-way analysis of variance (ANOVA) using the COSTAT 2.00 statistical analysis software manufactured by CoHort Software Company (1986).These results correlated with the findings that Allelochemicals presented in the aqueous extracts of different plant species have been reported to affect different physiological processes through their effects on enzymes responsible for phytohormone synthesis and were found to associate with inhibition of nutrients and ion absorption by affecting plasma membrane permeability. Retama retam species have phytotoxic effect on germination and plumule and radicle length of Bromus tectorum and Melilotus indica the germination and plumule and radical length was sensitive to the increasing concentration of the aqueous extract. Based on the results of this study: The species with the strongest allelopathic potential such as Retama retam must be examined for their selective action on other specific plants including weeds and crops under field conditions, their allelopathic activity will be much more detailed. Analysis of possible allelochemicals in these plants is also required. The isolation and characterization of growth inhibitors, which might be responsible for the strong allelopathic potential of these species is needed. There is possibility of using these allelochemicals directly or as structural leads for the discovery and development of environment friendly herbicides to control weeds.

Key words: Allelopathy, germination, medicinal plants, weeds.
5.25 Sub Lethal Effects of *Otostegia persica* on Predatory Bug *Deraeocoris lutescens*

Zamani Dehyaghobi, Reza1,2, Ahmadi Kamal1, and Salari Elham1,2
1Depart. of Plant Protection, College of Agric., 2Member of Young Researchers Society, Shahid Bahonar Univ. of Kerman. Depart. of Plant Protection, Faculty of Agric., Shahid Bahonar University of Kerman, 3Department of Plant Protection, College of Agriculture, Shahid Bahonar University, Kerman, 4Member of Young Researchers Society, Shahid Bahonar University of Kerman, Iran.

**Abstract:** The destructive effect of pesticides on the human and environment provide more botanical compound for pest control alternative to pesticide as a rich source of bioactive chemicals. Understanding the impacts of natural compound against natural enemies require a variety of investigations to determine both the selectivity of those agents against natural enemies and their other possible effects on the biological characteristics of the natural enemies in addition to mortality. During these studies, the ethanolic extracts of *Otostegia persica* (Labiatae) were assayed for their effects on pre-imago stages of predatory bug *Deraeocoris lutescens* (Hemiptera: Miridae). Experiments were carried out at 25±1°C temperature, relative humidity of 60±10% and 16 hours of artificial light at an intensity of about 4000 lux. Ethanol (95%) was used as control. The result showed that in concentration 0.15 mg mL−1 no significant differences were found in the mean of the duration of embryonic development of the predator after being exposed to this plant extract and control. Whereas the means of hatching rate (%) of eggs of the predator treated with this plant extract was significantly lower than control (p ≤0.05). Also the result indicated that the extracts of *O. persica* caused significantly increased the developmental time of the predatory males compared with control. Therefore, in integration of ethanolic extract of *O. persica* with the predatory bug, it is required to adjusted concentration and application the plant extract at the appropriate time to reduce the side effects resulting from this plant extract.

**Key words:** Bug, *Deraeocoris lutescens*, *Otostegia persica*, sub lethal.

5.26 Insecticide activity of *Ocimum basilicum* extracts against the locust *Schistocerca gregaria* (Forsk) (Orthoptera, Acrididae)

Tail Ghania1, Kara Fatma, Z1, and Bounaceur, F.2
1Department of Biology, Faculty of Sciences Agro-Veterinary, Saad Dahlab University Blida. 2Faculty of Natural Sciences and Life, University Ibn Khaldoun. Tiaret, Algeria.

**Abstract:** The aromatic and medicinal plants are a real bank of chemical molecules that are secondary metabolites. These metabolites play a major factor in plant adaptation to their environment. Besides their involvement in the workings of plants, and their defense. The secondary plant compounds are often considered as a defense of the producing plant against various organisms such as pathogens and pests. These compounds are very numerous and varied, and some are widely distributed, such as alkaloids, tannins and terpenes. In order to seek alternatives to chemical control methods were evaluated under laboratory conditions the effect of alkaloids extracted from leaves of *N. oleander* on desert Locust *Schistocerca gregaria*. Many toxic constituents have been isolated from *N. oleander* with a very wide field of activity (insecticide, antimitotic, cardiotonic properties). Active ingredients present in cardiotonic activity of *N. oleander* is oleandrin (or folinéride), and the nériine digitoxigenin. The chemical composition of the oleander is a poisonous plant involved in serious accidents or fatal. Alkaloids dissolved in ethanol at 1% were applied at concentrations: 5, 10, 20 and 50 µl / ml (corresponding to concentrations: C1, C2, C3 and C4) for toxicity testing purposes. The test was performed on 10 individuals for each dose. The mortality rate of desert eight days after treatment with a dose of 5µl / ml was 81.97%. For doses of 20 and 50 µl / ml, mortality was 100%. The alkaloid extracts of leaves of *N. oleander* have a potential as an insecticide against *S. gregaria*. Therefore, they can be integrated in the fight against locusts devastating crops.

**Key words:** Alkaloids, insecticide activity, *Schistocerca gregaria*, *Nerium oleander*, toxicity.
6.1 Studies of Morpho-Physiological and Phenological Aspects for a Collection of Algerian Durum Wheat (*Triticum durum* Desf.)

**Belattar, R¹**, **Boudour, L²**, and **Sellal, A³**.

¹,²Department of Nature Sciences and life, University of Mentouri Constantine, Algeria. ³Control laboratory, treatment plant, Bordj Bou Arreridj M'sila Road.

**Abstract:** A collection of 215 genotypes belonging to two varieties of Algeria durum wheat (*Triticum durum*) was obtained for this study. The field work was done at the experimental farm Technical Institute for Field Crops (TIFC/ITGC) 2008-2009. The climatic conditions, in this period (temperature and precipitation) were more or less favorable to the different phases of growth of our plants. However, their effects on phenological and morpho-physiological parameters measured with a different genotype to another for the two varieties studied: *leucomeulon* and *Reichenbachi*. The multivariate analysis revealed the existence of very important intra-and intervaritale variability. Thus most of the genotypes of the variety *Reichenbachi* present physiological and morphological aspects allowing a better development of plants. While many genotypes of the variety *leucomeulon* are more performance in terms of production.

**Key words:** Adaptation, morphology, phenology, physiology, *Triticum durum*.

6.2 The Arthropods in Three Stations of *Lavandula stoechas* L. (Labiatae): Diversity and Approach Bio-ecological in the Region of Tlemcen (N-W Algerian)

**DAMERDJI A.** and **BOUDAOUH H.**


**Abstract:** The region of Tlemcen is located in the North Western port of Algeria. It is characterized by Mediterranean climate. Lavender is an aromatic plant, used in perfumery; it belongs to the Labiatae family. A faunistic inventory is realized in the national park at Tlemcen. Three stations are described. Samplings was carried out from March to July 2010, are divided into 10 samples. Arthropods species richness is estimated at 48 with 5 Arachnida, one of Crustacean and 42 entomological species. The monthly seasonable importance is given by insisting on the principal faunistical groups notably the insects. The vertical distribution of Arthropods is shown. The ecological indices (frequency – abundance – density) are calculated. The diversity index is designed to Coleoptera, Lepidoptera and Hymenoptera.

**Key words:** Algeria, arthropods, bio-ecology, diversity, *Lavandula stoechas*, vertical distribution.
6.3 Medicinal Plant Collection in Southwest China: An Ecological and Societal Analysis

Huber, Franz K., and Seeland, Klaus
Society, Environment and Culture, Institute for Environmental Decisions, ETH Zürich, Sonneggstrasse 33, 8092 Zürich, Switzerland.

Abstract: During repeated fieldwork in two research sites in SW China (Muli County, Sichuan Province and Jianchuan County, Yunnan Province) between 2004 and 2011, a total of 177 rural households have been visited and a survey on socioeconomic background of the households and the use of natural resources, in particular medicinal plants and mushrooms for subsistence and cash income, has been conducted. Neither market accessibility, nor household education level or amount of agricultural field area significantly correlates with the amount of income from the collection of medicinal plants. In our field sites in Southwest China, medicinal plant collection is thus not a livelihood strategy for the remote and marginal population only, but a secondary income source for the majority of households. However, there is a negative correlation between the total household cash income and the share of income from medicinal plants, indicating that medicinal plant collection plays only then a significant role in people’s livelihoods when other, more rewarding income sources are lacking. Due to the highly fluctuating market for medicinal plants, the collection of medicinal plants is generally driven by middlemen and traders, largely disregarding local ecological knowledge and social institutions related to the use of natural resources, and thus posing risks to vulnerable plant populations. In the wake of China’s economic opening however, the rural population is more and more participating in the national economy, both as consumer and as provider of labor. The decreasing dependence of the rural population on income from medicinal plant collection seems to constitute a means of conservation for medicinal plant populations in Southwest China. However, recently increased living standards also pose a threat to these resources as a backup income source, in case of economic slow-down.

Key words: Collection, ecology, medicinal plant, southwest china, societal analysis.

6.4 Climate Change and Ethnobotany of East Mediterranean Part of Turkey

Ozturk Munir1, Altay Volkan2, and Salih Guce13
1 Ege University, Science Faculty, Botany Department, Bornova, Izmir, Turkey. 2 Mustafa Kemal University, Faculty of Science & Arts, Biology Department, Antakya, Turkey. 3 Institute of Environmental Sciences, Near East University, Nicosia, The Northern Cyprus.

Abstract: Ethnobotanical data forms were prepared as follows; Date: --Research area (District/Village):---Informants name:--Age: --Addresses/Telephone number: --1.Local name of plant: --2. Part of plant:--3. Usage purpose of plant:--4. Dosage: --5. How to use it (powder, pulp, tea, etc.) --Internal: External □ 6. Usage period of plant: --7. Side effect of plant : ---- These were distributed among the local inhabitants in the different cities of East Mediterranean part of Turkey. The material was also collected from earlier published data. The herbal medicines coming from the mountainous areas of this region are in particular very important, because these are already under threat due to several abiotic stresses. Species belonging to the genera Digitalis, Galanthus, Artemisia, Primula, Hypericum, Aconitum, Paeonia, Thymus, Lupinus, Rhus, Rosa, Salvia, Origanum, Nigella, Matricaria, Carum, Carthamus, Allium, Equisetum, Pinus, Chenopodium, Glycyrrhiza, Sanguisoraba, Hedera, Inula, Tussilago, Fraxinus, Thymbra, Quercus, Tamus, Asparagus, Colchicum, Cyclamen, Rumex, Smilax, Celtis, Rumex, Crithmum, Nasturtium, Ajuga, Alyssum, Aubrieta, Cirsium, Ziziphora, Aethionema, Centaurea, Cephalaria, Phlomis, Scabiosa, Scutellaria, Verbascum, Micromeria, Prangos, Gundelia can loose the race, and trees like Aesculus hippocastanum and Salix alba may face local endangerment. The rich plant diversity here includes a huge number of endemics as well. Ethnobotanically important species are passing through a critical stage. Situation may become more dangerous for the species growing at high altitudes. Climate changes can affect the chemical composition, secondary metabolites together with other compounds, the morphological and phenological behaviour and thereby the survival of these valuable bioresources in the East Mediterranean. Ethnobotanical surveys are needed for
capturing genetic diversity before we loose the same. Experimental studies related to the effects of different temperatures on the secondary metabolites, nutrients, antioxidant levels and other compounds in the MAPS growing at high altitudes should be started, and should also include the effects of soil moisture, grazing, competition, light exposure and fire on these parameters. Conservation and sustainable use of plant diversity in the region is an essential element of any strategy to adapt to climate change. Our aim here is to make an attempt to present an overview of the MAPS distributed at high altitudes in the East Mediterranean part of Turkey, compare the situation with other countries in the region.

Key words: Climate change, ethnobotany, mediterranean, Turkey.

6.5 Useful Flora of a Steppe Area: M’sila, Algeria

REBBAS Khellaf1, BAHLOULI Fayçal2, BOUNAR Rabah1, GHADBANE Mouloud1, CHERIEF Abdelkader2 and BENDERRADJI Laid1

1 Department of the SNV, Faculty of Science, university of M’Sila. 2 Department of Agronomy, Faculty of Science, university of M’Sila ; 28000, Algeria .

Abstract: The area of M’Sila presents a very interesting natural vegetation; formations of altitude in Cedrus atlantica and others in Pinus halepensis, Juniperus phoenicea and in Artemisia herba alba. These formations contain flora of an economic and ecological interest. With an aim of preserving and of developing this natural inheritance, we contributed to index the medicinal plants used by the villagers. An ethno botanic investigation was carried out near the inhabitants of the communes of the area of M’Sila (healer, herbalist, and old people) to join together the maximum of information into the use of these plants. One listed 59 medicinal plants belonging to 33 families on the basis of 182 card questionnaires carried out on the ground which shows the use of these plants of interest medicinal. Endemic and rare species are inventoried like: Sedum acre subsp. neglectum (Ten) Archang, Dorchicum atlanticum (Chabert) Rouy, Veronica rosea Desf, Helianthemum hirtum subsp. ruficomum (Viv) M, Astragalus armatius subsp. tragacanthoides (Desf) Maire., Hedysarum naudinianum L. (Coss), Centaurea involucrata Desf., Pulicaria arabica subsp. inuloides (DC) M., Erinacea pungens Boiss, Rupicarpus numidicus Pomel, Androsace maxima L., Rhamnus alaternus subsp. myrtifolia (Willd) M., Pitranthus scoparius Benth and Hook, Ebenus pinnata L., Senecio leucanthemifolius subsp. poiretianus M., Danaa verticillata Janchen, Myosotis collina Hoffm, Ranunculus millefoliatus Vahl, Saxifraga veronisifolia Pers., Draba hispanica subsp. djurdjurae var. cladotricha Maire, Lamium longiflorum Ten., Phlomis herba venti L., Smyrnium perfoliatum L., Cotoneaster racemiflora (Desf.) Koch., Viola munbyana Boiss. and Reut., Himanthoglossum hircinum (L.) Spreng., Ophrys numida Devillers-Terschuren and P. Devillers, Ophrys battandieri E. G. Camus.

Key words: Endemic, ethno botanic investigation, safeguarding, steppe, valorization.

6.6 Assessment Phenotypic Diversity and Cultivation Potential of Coridothymus capitatus (L.) Reichenb. Fil growing Wild in Jordan

Saifan S1, Duwayri M2, and Alali F3

1 Directorate of biodiversity, genetic resources and medicinal plant, National Center for Agricultural Research and Extensin, 19381, Amman, Jordan. 2 Department of plant horticulture and agronomy, Faculty of Agriculture, University of Jordan, Amman, Jordan. 3 Department of Natural Product Chemistry, Faculty of Pharmacy, Jordan University of Science and Technology. Irbid, Jordan.

Abstract: Coridothymus capitatus (L.) Reichenb. fil is a medicinal and aromatic plant growing wild in Jordan and locally known as Za‘tar Farisi. The phenotypic diversity and potential cultivation study comprised fifteen wild populations of Coridothymus capitatus, one wild population of Thymbra spicata and two Thymbra. spicata landraces. The investigated wild populations of Coridothymus capitatus showed various degrees of phenotypic variation based on the characters under investigation. Significant variations were obtained for quantitative characters, the coefficient of variation percentage (G.V %) ranged from 12.60 % to 39.20 %. The average estimate of
Shannon’s diversity index \( (H') \) was 0.58. The genetic distance among pairs of populations was low. *Coridothymus capitatus* populations introduced for cultivation showed a good stand and potential toward producing dry herbage yield (3046 kg/ha). Cultivated populations showed phenotypic variation in the investigated traits. The results of this study indicate that a broad range of genetic variation exist among populations of *Coridothymus capitatus* collected from wild habitats in Jordan, and among *Thymbra spicata* populations. Seeds of *Coridothymus capitatus* and *Thymbra spicata* were conserved (ex situ) in seed bank and in the field bank. The results obtained pave the road for a potential commercial and large-scale cultivation and oil production from *Coridothymus capitatus* species.

**Key words:** Cultivation, phenotypic variation, shanonIndex, thyme.

### 6.7 The Status of Medicinal Plants in Jordan

Sawsan A. Oran  
Dept. of Biological Sciences, Faculty of Sciences, University of Jordan, Amman- Jordan

**Abstract:** Flora of Jordan is rich with regards to its number of plant species. A number of 2978 species belongs to 120 families and 719 genera are recorded in Jordan. 20% of the total flora are medicinal plants that are used in folk medicine and can be used in pharmaceutical industry. A total number of medicinal plants are recorded, 363 species of vascular plants, belonging to 263 genera and 86 families. The taxa recorded are wild plants that occur in Jordan, except few cultivated and well known to the people in the country.

**Key words:** Flora, Jordan, medicinal plants, species.

### 6.8 The history and conservation aspects of plants mentioned in the Qura’n

Shahina A Ghazanfar  
Royal Botanic Gardens Kew, UK.

**Abstract:** Several plants are mentioned in the Qura’n and Hadith that have a history of use as food, as medicinal or have value for some particular characteristic they hold. Twenty plants are mentioned in the Qura’n and some fifty four plants in the Hadith. Most of the plants in the Qura’n can be identified to present day plants by the mention of their classical Arabic name. A couple, however, are difficult to name with certainty, and suggestions to their identity have been put forward with regard to the context in which these have been referred to. Here, I illustrate a few plants that have been mentioned several times in the Qur’an and trace their natural history and that of their use and cultivation, and, in the current environment of global climate change and habitat loss, discuss why it is important to conserve them and their cultural history.

**Key words:** Arabia, conservation, cultural history, medicinal plants, quranic plants.

### 6.9 The Eco-Geographic Distribution and Molecular Diversity of Wild Akkob (*Gundelia tournefortii* L.) in Jordan

Susan Dura  
Biotechnology Department, NCARe, Jordan.

**Abstract:** Akkob (*Gundelia tournefortii* L.) is an important edible plant growing wild in Jordan and it’s known for its pharmaceutical value. A better understanding of its genetic diversity and distribution are essential for its conservation and use. Nineteen populations of *G. tournefortii* were collected from various regions in Jordan, those representing three eco-geographical systems. RAPD and SSR markers were used to assess genetic diversity of *G. tournefortii* populations. Twenty four primers were used to amplify 51 bands out of which 42 (82.4%) were polymorphic. Cluster analysis was able to produce three major groups and four subgroups and the genetic distance was 8.58. Analysis of molecular variance (AMOVA) revealed differences among groups accounted for 38.6% of the total variation, whereas differences among populations and within populations were 40.9 and 20.5%, respectively.

**Key words:** Asteraceae, genetic diversity, *Gundelia tournefortii*, ISSR, RAPD.
7.1 Potential of Some Medicinal and Aromatic Plants for Phytoremediation of Soils Contaminated with Heavy Metals

Angelova, V\textsuperscript{1}, Ivanova, R\textsuperscript{2}, and Ivanov, K\textsuperscript{1}.
\textsuperscript{1}Department of Chemistry, Agricultural University. \textsuperscript{2}Department of Plant science, Agricultural University, Plovdiv, Bulgaria.

Abstract: Environmental pollution with heavy metals is a global problem, and therefore the development of phytoremediation technologies for plant-based clean-up of contaminated soils is therefore a significant interest. Medicinal plants appear to be a good choice for phytoremediation since these species are mainly grown for secondary products (essential oil) thus the contamination of the food chain with heavy metals is eliminated. The accumulation of cadmium, lead and zinc by medicinal and aromatic plants from soils contaminated with heavy metals was studied in the vicinity of the Non-Ferrous-Metal Works near Plovdiv, Bulgaria. In the study were included 14 medicinal and aromatic plants - Mentha piperita L., Salvia officinalis L., Salvia sclarea L, Silybum marianum L, Calendula officinalis L., Matricaria chamomilla L., Ocimum basilicum L., Lavandula vera L., Vinca Minor L., Valeriana officianalis L., Centranthus L., Melissa officinalis L., Datura Stramonium L. and Nepeta Cataria. The contents of the heavy metals in the plant material /roots, stems, leaves, flowers, seeds, etc./ and their products were determined after the method of the dry mineralization. The quantitative measurements were carried out with ICP. A positive relationship was established between the concentrations of metal accumulated in different parts of the plants and the metal levels in the contaminated soils. A clearly distinguished species peculiarity exists in the accumulation of the heavy metals in the vegetative and reproductive organs of studied plants. The medicinal and aromatic plants can be divided into three groups which differ considerably in their ability to accumulate heavy metals: (i) low accumulators; (ii) moderate accumulators and (iii) high accumulators. Each one of the plants from these groups can be successfully grown in slightly polluted calcaric fluvisoils. The tested medicinal plants cultivated on highly heavy metal polluted soils could be used in pharmacy only after analysis for heavy metal concentration in them, in order to avoid any risk of contamination of the end products (drugs). Melissa officinalis L. and Valeriana officianalis L have the potential of being used as a biomonitoring plants for heavy metal pollution in the polluted soils. Salvia sclarea L. was the most perspective plant from family Lamiaceae for growing in industrially polluted region - a very good accumulator of heavy metals and could be used for cleaning the toxic metals from polluted soils, as well as the end product (oil) can be used in the perfumery and cosmetics and tobacco industries.

Key words: Aromatic plant, heavy Metals, phytoremediation, soils.

7.2 Morphological Effects and Zinc Accumulation of Micropropagated Plants of Paulownia tomentosa (Thunb.) Steud.

BEN BAHRI Nada, BETTAIEB Taoufik, and LARIBI Bochra
Institut National Agronomique de Tunisie. 43, Av. Charles NICOLE-1082, Tunis, Tunisia.

Abstract: In vitro essay of Paulownia tomentosa (Thunb.) Steud. was undertaken to determine the capacity of this medicinal plant to accumulate heavy metal in its tissues. In this case, the nodal explants were placed on Murashige and Skoog’s medium (1962), added with 1.0 mg/l indole-3-butyric acid (IBA). The ZnSO$_4$ was supplemented to the culture medium at various concentrations 200, 400, 600, 800 and 1000 µM. The MS medium free of Zn served as control. The height of plantlets, the number of nodes, the number and length of roots and the biomass of the in vitro plants were determined. The Zn content in plant tissues was measured by an inductively coupled plasma-optical emission spectrometer (ICP-OES, OPTIMA 2000 DV, and PerkinElmer, USA). Results showed that highest Zn level (1000 µM) induced a significant reduction in shoot height, (18.86%) and root number (84.9%) of plantlets in comparison to the control. The highest Zn concentration in the culture medium caused also an important decrease in fresh and dry biomass.
by 22.8% and 50.5%, respectively compared to the control. Furthermore, a high Zn accumulation in the plantlet tissues which varied from 121µg/g dry matter (DM) in the control to 2580 µg/g (DM) in the presence of 1000 µM Zn was noticed. Consequently, *Paulownia tomentosa* could be considered as a bio-indicator and Zn accumulator medicinal plant.

**Key words:** *In vitro* propagation, *Paulownia tomentosa* (Thunb.), phytoremediation, ZnSO₄, Steud.

### 7.3 Heavy Metals in Medicinal, Aromatic and Spicy Plants

**Kacharava Tamar, Kacharava K., and Koiava I.,**

*Biotecnology Centre of Georgian Technical University, Tbilisi, Georgia.*

**Abstract:** The object of our research was the medical, aromatic and spicy plants: Valeriana officinalis, Valeriana alliariifolia, Origanium vulgare, Vaccinium myrtillus, Rhododendron Caucasicum and the soil cover of 10-30 cm depth. Fifteen heavy metals content were defined in the areas of Georgia. The pollution level of medical, aromatic and spicy plants and soil with the heavy metals were ascertained according to regions on a basis of comparison with the maximum allowable concentrations that will enable us to produce clean, high-quality phytomaterials that are demanded on the domestic market as well as has the high export potential.

**Key words:** Aromatic plant, heavy metals, spicy.

### 7.4 Essential and Toxic Elements Distribution in the System Teucrium Speies/Serpentine Soils in Bulgaria

**Karadjva Irina¹, Pavlova Dolja², and Krasteva Ilina³**

¹Department of Analytical chemistry, Faculty of Chemistry and Farmacy, University of Sofia, blvd. J. Bouchier 1, 1164 Sofia. ²Department of Botany, Faculty of Biology, University of Sofia, blvd. Dragan Tzankov 8, 1164 Sofia.³Department of Pharmacognosy, Faculty of Pharmacy, Medical University, 2 Dunav str., 1000 Sofia, Bulgaria.

**Abstract:** Medicinal plants play a significant role in providing primary health care services to rural people and are used by about 80% of the communities living in mountains in Bulgaria. An average of 6 000 tons of herbs are gathered annually, most of which represents natural plant resources. The increased interest in, and constantly expanding use of, the medicinal plants clearly raises questions about the state and capacity of their populations from one side and their quality control from other side. Ultramafic (serpentine) soils typically host a distinctive flora and vegetation, largely affected by the edaphic and physical characters of these soils. *Teucrium* species widely used as medicinal plants are typical excluders well distributed and acclimatized with “difficult” conditions of serpentine soils. The aim of present study is to establish distribution of essential and toxic elements in *Teucrium* species as well as in their rhizosphere soil samples. Based on the results obtained after various extraction steps, the real and potential acidity and redox potential of the soils, uptake, mobility, and bioavailability of essential and toxic elements are discussed. Correlations between mobile ion concentrations in soil solution and metal concentration in usually used tea infusions or water/methanol extracts are presented. Correlations between toxic elements content and flavonoids levels are studied. Conclusions on toxicity and applicability of *Teucrium* species from serpentine soils as medicinal plants are defined.

**Key words:** Medicinal plants, redox potential, serpentine, Teucrium species, toxic elements.
Abstract: Populations of Hypericum cerastoides, H. aucheri, and H. montbretii growing on serpentines in Bulgaria and their soils were analyzed for total content of Fe, Ni, Mn, Cr, Co, Cu, Zn, Pb, Cd, and As using ICP AES after acid digestion. The same elements were measured in their methanol extracts by electrothermal atomic absorption spectrometry. H. montbretii has a great pharmaceutical potential with its well-documented chemical content. It shows morphological similarities with the well-known medicinal plant Hypericum perforatum known also as tolerant of heavy metals. It is known that the distribution and abundance of medicinal plants are directly correlated with the edaphic factor. The aims of this study were to investigate serpentine populations of three Hypericum species to estimate: 1) concentration of chemical elements in aerial plant biomass and associated soil samples in order to assess their ability to tolerate/accumulate trace elements; 2) correlations between total metal concentrations in aerial plants biomass and their methanol extracts. Metal concentrations varied across species and sites. The metal concentrations for Fe, Ni, Cr, and Co are elevated in all species. It is also notable that difference in heavy metal concentration in a particular plant species collected from different regions is related to the site from where the samples were collected. The metal contents of the aerial biomass were higher than those of the methanol extracts. The range of metal contents in methanol extracts was found as follows: Zn (44–430µg/L) > Fe (61–133µg/L) > Mn (55–130µg/L) > Ni (18–133µg/L) > Cu (18–50 µg/L) > Co (6-23 µg/L) > Pb (1.62-6.22 µg/L) > Cr (1.1–1.9µg/L) > Cd (0.15–0.43µg/L). The content of As was lower than 0.2µg/L for most of the cases. Positive correlation coefficients were established between Ni and Cr in aerial plant biomass and Mn in the extracts. All investigated plants are not hyperaccumulators although the metal content in some of them was higher than the proposed limits. So that we do not recommend collecting plants from serpentines for pharmaceutical uses and traditional medicine.

Key words: Heavy metal, hypericum species, methanol extracts.
8.1 Development of Dental Gel of Complex Action «Aromadent Plus» Composition and Technology

Baranova Inna, Lebedynets Olga, and Bespalaya Yuliya
National University of Pharmacy, Kharkiv, Ukraine.

Abstract: Gel is the rational medicinal form for periodontium topical therapy – it is well distributed and absorbed by the mouth mucous membrane that provides high bioavailability of the active ingredients. The interaction of the gel with mucous membranes improves the penetration of components. The diffusion of active substances in the mouth cavity is decreased due to the hydrogel viscosity, and moderate washing off by saliva allows saving the optimal concentration of substances on the localized gum area. On the basis of complex studies conducted we have chosen tea tree and eucalyptus essential oils as plant components which possess antibacterial, anti-inflammatory, regenerative properties, and also sulphatized glycosaminoglycan (sodium chondroitin sulphate) as anti-inflammatory, wound healing, and regenerative agent. As a result of a complex of physical and chemical and technological studies a stable gel system on the basis of hydroxyethylcellulose and other auxiliary substances was worked out. Addition of sorbitol in 10% concentration provided a moderate osmotic activity of the stomatological gel. The microbiological studies showed the addition of tea tree and eucalyptus essential oils (2% of each) to be rational as the synergy of the antimicrobial activity displays. The optimal therapeautic concentration of sodium chondroitin sulphate (1,0 %) has been determined on the basis of biological studies. The modern methods of qualitative and quantitative determination of sodium chondroitin sulphate (HPLC), tea tree and eucalyptus essential oils (gas chromatography) were worked out for the proposed medicinal preparation standardization. The proposed methods differ by their high sensitivity and results’ reproducitvity. As a result of stability study of stomatological gel “Aromadent plus” the expiration terms and storage conditions were determined – 2 years in aluminium tubes with varnished cover at room temperature. Pharmacological studies showed the remedy to have expressed anti-inflammatory on the model of carrageenan oedema in mice. The active components of the gel have been proven to be cyclooxygenase inhibitors and not to have a serious impact on the leukotriene phase of inflammation on the zymosan oedema model in rats. The presence of expressed reparative activity of the dental gel was proven on the model of linear incised wounds in rats. The LD50 for the stomatological gel “Aromadent plus” exceeds 15000 mg/kg at intrastomachal introduction in rats which allows to attribute it to IV toxicity class – relatively safe substances. On the basis of conducted pharmaco-technological, structural and mechanical, physical and chemical, microbiological and other researches composition and technology of gel «Aromadent plus» was proven.

Key words: Aromadent Plus, composition, dental Gel, technology.

8.2 Corrosion Inhibition by Limonium touhinni (Plumbaginaceae) Extract in Acid Medium

BENAHMED Merzoug1, LAFHAL M2, DJEDDI N1, AKKAL S2, LAOUAR H.3
1Laboratoire des molécules actives et applications, Université Tébessa. 2Laboratoire de Phytochimie et Analyses physicochimiques et Biologiques, Département de Chimie, Faculté de Sciences exactes, Université Mentouri Constantine, Route d’Ain el Bey, 25000 Constantine,.. 3Département de biologie, Université de Séti,f. Algérie

Abstract: The inhibition of the corrosion of C steel in 1 M HCl by Limonium touhinni has been studied by weight loss, potentiodynamic polarization method and electrochemical impedance spectroscopy measurements. The inhibition efficiency increased with increasing concentration of the inhibitor. The results of weight loss studies correlated well with those of impedance and polarization studies.

Key words: C steel, inhibition, electrochemical spectroscopy, Limonium touhinni.
8.3 Development of Medicinal Plants Extracts Producing Modes

Grubnik Igor, Bondarenko Alena, Gladuch Ievgeniy, and Stepanenko Sergiy
National University of Pharmacy, Kharkiv, Ukraine.

Abstract: The relevance of herbal medicine has grown immeasurably the last decade. The therapeutic effects of many types of herbs used in the present time in medical practice, due to the presence of various biologically active substances, which at introduction into human body determine one or another physiological effect. These acting physiologically active substances have diverse composition and belong to different classes of chemical compounds. The aim of our study was to determine optimal conditions for extraction of biologically active compounds from herb and roots of comfrey, fruits of chestnut, sage grass, plantain leaves, violet grass leaves of burdock and ivy leaves. As a method of extraction remaceration method has been chosen that can effectively extract the main groups of compounds. We have studied the influence of such factors as the degree of raw materials grinding, the ratio of extractant, the ratio of raw material – extractant, extraction time and temperature. Have investigated raw materials with different particle size. As extractant have studied solvents of different polarity: hexane, chloroform, ethyl alcohol, water-alcohol mixtures (containing different amounts of ethanol), purified water. We have investigated the following raw material – extractant ratio from 1:5 to 1:20. Extraction was carried out at two temperatures: 25 °C and 95 °C. The evaluation criteria were yield of extractives and the yield of biologically active substances of different chemical nature. The experiment revealed that at the extraction of raw materials by 40 % ethyl alcohol yield of extractives and the amount of oxidized phenols was the highest. By increasing the ratio of raw material to extractant from 1:10 to 1:20 yield of extractives and the amount of oxidized phenols increased slightly. For most types of medicinal plants has been established optimal ratio of raw material-extractant 1:12. To develop production technology for dense extracts of plant materials and the selection of the optimum extraction temperature were obtained extracts in two temperature modes: at room temperature (each extraction lasted for 12 hours), and at a temperature of 90 °C (each extraction – within 2 hours), the multiplicity of drains 5. The results showed that temperature significantly affects only the extraction of polysaccharides from plant materials. Basing on the conducted work we have developed a technology for producing substances from various kinds of medicinal plants and gained a few series in the laboratory for further study.

Key words: Development, medicinal plants extracts, modes.

8.4 Design and Synthesis of Some Benzoxazolinone Derivatives

F. Guenadil and H. Aichaoui
Laboratoire de Chimie Pharmaceutique, Departement de Biologie Universite’ d’el Tarf 36000, BP 73, El Tarf, Algeria

Abstract: Benzoxazolinone (BOA) was first discovered in nature by Virtanen and Hietala as an anti-Fmariull factor in rye seedlings. This heterocyclic template has long been known as a bioisostere of catechol and can be considered a “privileged scaffold” in the design of new pharmacophores. Therapeutic applications of this platform are very broad and range from analgesic anti-inflammatory compounds to anticoagulant and neuroprotective anticonvulsant agents. In particular, their derivatives 6-benzoyl- Benzoxazolinone (CERM-10194) and its sulfur surrogate (S-14080) underwent clinical trials as anti-inflammatory analgesics. They were found to inhibit not only the arachidonic inflammatory cascade, but also to induce the release of an opioid peptide (possibly endomorphin) in the periphery. On the other hand, Valproic acid (VPA) is a well-known therapeutic agent that has been for a long time in clinical use for treatment of epilepsy and bipolar disturbances without significant toxicity. Valproic acid has been recently reported to reduce estradiol-induced MCF-7 cell proliferation. Thus, in an effort aimed at developing mild and flexible strategies to design new Benzoxazolinones and synthesize heterocyclic scaffolds to prepare new valuable building blocks in medicinal chemistry, we devised an efficient method to get access to 6-benzoyl-3-valproyl-Benzoxazolinone and their corresponding sulfur bioisoster, which are analogs of the prototypic CERM 10194 and S-14080.

Key words: CERM 10194, derivatives, epilepsy, benzoxazolinone, valproic acid.
8.5 Effects of Fining on Antioxidative Activity of Merlot Wine Obtained with Increased Content of Stem and Seed

Puškaš, Vladimir and Miljić, Uroš
University of Novi Sad, Faculty of Technology, Blvd. cara Lazara 1, 21000 Novi Sad, Serbia

Abstract: The structure and amount of phenolic compounds in the wine depend on the grape variety, agroecologic and vinification conditions. The influence of pomace enrichment with grape stems and seeds during maceration, as well as the effect of commonly used fining agents (albumin, bentonite, gelatine and PVPP) on antioxidative activity of Merlot red wines were investigated. Besides control wine, produced from pomace which contained original content of seeds, without stems, other wine samples were obtained from grape pomace supplemented by 50% of previously separated stem or by 120 g seed/kg. The antioxidative activity of red wines towards DPPH• and hydroxyl (•OH) radicals was determined by electron spin resonance (ESR) spectroscopy. Enriching of pomace with 120 g seeds/kg resulted in increase of antioxidative capacity of wine. In wine enriched with tannins and flavan-3-ols from the seeds, the DPPH• radicals were completely eliminated (AA_DPPH•=100%), while stem addition scavenged 88.21% of these radicals (AA_DPPH• of control wine was 83.73%). Regarding the scavenging capacity against hydroxyl radicals, supplementation of pomace with seeds increased this parameter for 20%, while stem was not so efficient (5% increase). Applied fining agents, except gelatin, showed insignificant (p=0.05) influence on DPPH• scavenging activity of all wine samples. On the other hand, antioxidative activity towards hydroxyl radicals (AA•_OH) was mostly significantly changed after each fining treatment.

Acknowledgments: The authors appreciate financial support from the Ministry of Education and Science of the Republic of Serbia (Project TR-31002).

Key words: Antioxidative activity, ESR spectroscopy, fining agents, merlot wine, seed, stem.

8.6 Medicinal Plants in Bermet, Serbian Aromatic Wine

Miljić, Uroš and Puškaš, Vladimir
University of Novi Sad, Faculty of Technology, Blvd. cara Lazara 1, 21000 Novi Sad, Serbia.

Abstract: Bermet is aromatic, dessert wine with especially unusual and original taste. Bermet is made exclusively from grapes from hillside vineyards of mountain Fruška Gora (Vojvodina, Serbia) and it is enriched with up to 24 to 26 aromatic, medicinal herbs. Technology of Bermet production is passed down from generation to generation and its recipe was kept as a closely guarded secret. This rare wine is produced in limited quantities, only 15,000 to 20,000 bottles a year. This fact gives to the Bermet a special value and impressiveness. Nowadays, it is known that main medicinal plants included in Bermet production are: wormwood (Artemisia absinthium), yellow gentian (Gentiana lutea), anise (Pimpinella anisum), cinnamon (Cinnamomum zeylanicum), bitterbloom (Centaurium umbellatum), black mustard (Brassica nigra L), coriander (Coriandrum sativum), cloves (Syzygium aromaticum), carob (Ceratonia siliqua) and liquorice (Glycyrrhiza glabra). Besides these plants, orange and lemon peel, vanilla bars, dried figs and grape, as well as some quantities of nutmeg (Myristica fragrans), are added to Bermet. Pharmacological compounds from these plants have a powerful tonic, antioxidative, antiseptic, antidiarrheic and antipyretic effect. These plants are often used to remedy indigestion and gastric pain in Serbian folk medicine. They can be also used as a carminative and in regulation of the menstruation. Bermet, as a valuable herbal medicinal beverage, demonstrates the complementary effect of phenolic compounds from red wine and numerous pharmacological compounds from medicinal and aromatic plants added during its production. The aim of this paper was to emphasize the individual effect of these plants, in order to evaluate their contribution to the medicinal value of this aromatic wine.

Acknowledgments: The authors appreciate financial support from the Ministry of Education and Science of the Republic of Serbia (Project TR-31002).

Key words: Bermet, medicinal plants, pharmacological compounds, Serbia, wine.
8.7 Industrial Products from Indigenous Fruits of *Balanites aegyptiaca* (L.) with Emphasis on the Potentiality of Balanites Oil in the Treatment of Some Superficial Mycosis


1Faculty of Engineering & Technology, University of Gazira, Wad-Medani, Sudan, 2Faculty of Industrial Sciences & Technology, Universiti Malaysia PAHANG (UMP).

**Abstract:** Fruits of *Balanites aegyptiaca* were claimed as a potential source of steroidal sapogenins, raw materials for the partial synthesis of the important group of steroid drugs. The tree is indigenous to Sudan. Our research interests focused mainly on steroid constituents in fruit-parts and fruit accessions. However, other fruit by-products were encountered. Thirteen accessions of *Balanites* fruit were analyzed for their sapogenin content using infra-red spectroscopic method. Most of the sapogenins of *Balanites* fruit reside in the mesocarp (64%), followed by kernel (25%), and epicarp (10%). However, on a tissue-weight basis, kernel tissue was richest (2.5-5.0%) in several accessions. The 25α- to 25β-sapogenin ratio varied according to the fruit part (tissue) and developmental stage. Fruit kernel of *Balanites* yield as by-product of extraction, an interesting oil fraction that was characterized to be good dermatophytes. The study of crude extract of the fruit kernel oil (BKO) showed activity against fungi that is responsible for some dermatophytes diseases. BKO was prepared after kernel was ground and extracted on a Soxhlet extractor with n-hexane and dried by a Rotary evaporator. Applied doses on infected skin can be used topically on morning and at night for a period of 1-5 weeks depending on the patient's age and the type of fungus causing the infection. A suggested Scheme for *Balanites* fruit processing for steroidal sapogenin and by-products was proposed.

**Key words:** *Balanites aegyptiaca*, BKO, dermatophytes, steroidal sapogenin.

8.8 Swelling and Residue Studies on Biofilms Containing Mixture of Gelatin / K- Carrageenan as Biomedical Applications

Zaher K., El Kolli. M., and Benmesli. S.

Laboratoire des matériaux polymériques multiphasiques (LMPMP), Département de Génie des Procédés Faculté de Technologie, Université Ferhat ABBAS – Sétif.

**Abstract:** In this study two types of dressings in the form of thin films were prepared from a mixture of two natural biopolymers, namely gelatin and ζ-carrageenan. The protein and the polysaccharide were chosen because of their hydrosolubility and interactivity, respectively. Glutaraldehyde was also used to crosslink the films. Sodium azide (NaN₃) was used to avoid bacterial contamination. The biopolymer-based films were prepared from a mixture of pectin and gelatin by casting using the following procedure. 2.5 grams of gelatin/ζ-carrageenan mixture at a ratio of 88/12 were dissolved in 50 ml distilled water and a small amount of sodium azide, which was added to each solution to prevent bacterial contamination. After allowing the grains to swell for 35 min, the mixture was placed in a water bath heated at 60°C under slow agitation for 40 min. Once the resulting solution became clear, three different samples (5 ml, 10 ml and 15 ml) were withdrawn from the mixture and poured separately into 8.5 cm diameter polystyrene boxes in order to obtain films with different thicknesses. These samples were then allowed to dry in free air at room temperature for 3 to 4 days. The resulting films were crosslinked by means of glutaraldehyde (GTA). Crosslinking was carried out by pouring 20 ml of the GTA solution onto the dry films and allowing the reaction to take place for 24 h. Finally, the crosslinked films were washed with distilled water and dried in free air at room temperature. It was found that crosslinking much increased the absorption capacity, reflecting the strong interactions that developed between gelatin and ζ-carrageenan. The FTIR analysis also allowed us to identify the different functional groups through which gelatin and ζ-carrageenan chemically interacted. The quantitative analysis of the residue by means of UV spectroscopy indicated that the films were biodegradable and therefore can be used for biomedical applications.

**Key words:** Absorption capacity, dressing, gelatin, ζ-carrageenan, residue.
9.1 Nutritional and Medicinal Value of Major Legume Crops in the Kingdom of Saudi Arabia

Alghamdi, Salem S., 1 Ammar, Megahed H., 1 Migdadi, Hussein M., 1; Khan, Altaf M., 1 Osman, Magdi A., 2 El-Harty, and Ehab H. 1

1Legume Research Group, Plant production Department, Faculty of Food and Agricultural Sciences, King Saud University, P.O .Box 2460, Riyadh 11451. 2Food Science and Nutrition Department, Faculty of Food and Agricultural Sciences, King Saud University, P.O .Box 2460, Riyadh 11451, Saudi Arabia.

Abstract: In this study, 40 Faba bean genotypes, 28 chickpea genotypes and 35 lentil genotypes were analyzed for their agronomical performance, proximate and minerals composition, vitamins, amino acids profile, antinutritional factors and antioxidant activities. In faba bean genotypes, crude protein ranged from 31.5 to 37.7 %, fat from 1.52 to 2.12 %, carbohydrate from 42.7 to 49.3 %, moisture from 7.21 to 8 % and ash from 3.0 to 4.2 %. In chickpea genotypes, crude protein ranged from 19.8 to 24.9 %, fat from 3.6 to 5.1 %, carbohydrate from 62.5 to 69.7 %, moisture from 7.1 to 7.9 % and Ash from 2.7 to 3.9 % while in lentil genotypes, crude protein from 25.3 to 29%, fat from 0.79 to 1.19%, carbohydrate from 39.5 to 47 %, moisture from 11.6 to13.6 % and ash from 2.39 to 2.89 %. All the studied legumes genotypes were found to be good sources of essential minerals such as K, Mg, Ca, and P. The essential amino acids profile of all investigated genotypes compared favourably with the FAO/WHO requirement pattern except there were limiting source of tryptophan and sulphur containing amino acids. Antinutritional factors, i.e., protease inhibitor (trypsin and chymotrypsin) in faba bean genotypes ranged from 2.24 to 2.77 and 0.35 to 0.70 TIU/G respectively, whereas in chickpea genotypes 7.65 to 8.98 and 9.0 to 11.9 TIU/G. Tannin and phytic acid in faba bean genotypes ranged from 12.2 to 16.2 and 1.23 to 1.5 mg/100g while in chickpea genotypes 4.11 to 5.06 and 6.10 o 6.98 mg/100g respectively. Protease inhibitors, tannins and phytic acids in lentil ranged from 2.08 to 2.78 mg/100g, 0.52 to 0.79 and 0.72 to 1.09 mg/100g, respectively. Among antioxidants, lentil genotypes are a good source of phenolic contents (TPC) and total flavonoid contents (TFC) whereas faba bean and chickpea are moderate source of both phenolic contents (TPC) and total flavonoid contents (TFC). The data presented here, shows that some genotypes of faba bean, chickpea and lentils can serve as a significant source of crude protein, essential amino acids, and antioxidant activities that help in enhancing radical scavenging capacity. Feeding on legumes rich with antioxidants can help in reducing Hypocholesterolemic symptoms, and reported to have anti-microbial, anti-viral and anti-cancer properties.

Key words: Legume crops, medicinal value, Saudi Arabia Kingdom.

9.2 The Effects of Using Ground Basil to Improve Quality Characteristics and Sensing of the Shelf-Life of Minced Cold Beef Meat

Al-Rubeii, Amera M.S., Hamodi, S. J., AL- kabbani, and E. A.M.
Dept. of Animal Resources, College of Agriculture, University of Baghdad, Iraq.

Abstract: The objective of present study was to investigate the effect of using ground basil seed to improve some of the meat quality characteristics, sensory and limited storage time of minced cold beef meat. Ground basil seed was added at 0.1 and 3% to minced beef meat, these treatments were stored individually for 3, 6 and 9 days at 4ºC ± 1. After making several chemical, physical, sensing and microbial tests, Results showed that the process of adding ground basil seed to minced beef meat led to significant increase in moisture content, pH and water holding capacity (WHC), and decrease in fat and drip loss percentage. The process of adding ground basil seed to minced beef meat led to significant decrease (P<0.05) in thiobarbituric acid (TBA), peroxide value n(PV) as compare with the control. The results showed a significant sensory
evaluation improvement (P<0.05) in the organoleptic characteristics of minced beef meat (flavour, juiciness, tenderness, overall palatability). The process of added ground basil seed to minced beef meat led to reduced (P<0.05) total plate count during refrigerated storage periods. It can be concluded that added ground basil seed had positive significant influence on quality characteristics, sensing and microbial safety of minced beef meat when stored under refrigeration at 4°C up to 9 days.

Key words: Beef meat, ground basil seed, minced meat, quality, sensing.

9.3 The Effect of *lavandula* *spp* and *Chamaemelum* *spp* Oils on Some Quality Properties of Fruit Stirred Yoghurt

Bachir Raho Ghalem¹ ², Benali Mohamed¹ and Benattouche Zouaoui² ³

¹Biotoxicology laboratory, Biology Department, Science faculty, Djillali Liabès University of Sidi Bel Abbès. ²Biology Department, Science faculty, Mascara University, Algeria.

Abstract: The quality properties of yogurt samples made with two commercial essential oils extracted from *lavandula* *spp* and *Chamaemelum* *spp* were examined. Yogurt samples were produced from pasteurized milk, milk powder, sugar and fruit preparation inoculated with yogurt cultures. Physical, chemical, microbiological properties of the yogurt samples were investigated on days 2, 7 and 21 during storage. In the same time, the sensory properties (flavor, taste and texture) of the finished products were determined. The results showed that titratable acidity increased while pH, Ash and proteins values gradually decreased during the storage period of 21 days. Fecal coliform, *S.aureus*, *Salmonella*, yeast and mould were not detected in all samples during the storage period and total coliforms were detected in the yoghurt added with 0.14g/L (C1) and 0.21 g/ L of essential oils. Sensory analysis indicated that fruited Stirred Yoghurts enriched with 0.14g/L were more favoured than the other samples.

Key words: chemical, essential oil, microbiological, physical, sensory properties, yoghurt.

9.4 Efficacy *In Vitro* and *In Vivo* Essential Oils Extracted from Leaves of *C.limonum* Vis-à-Vis *Alternaria solani*

Hamdani fatima zohra¹ , Allem Rachida² , Meziane Malika³ , Houari aek³ , Setti Benali³ and Ali Arous samir⁴ ⁵

¹Agronomic Institute Laboratory of Bioresources. ² faculty of science Laboratory of Bioresources. ³ Agronomic Institute laboratory production and plant protection. ⁴ Agronomic Institute laboratory production and plant protection. ⁵Agronomic Institute laboratory production and plant protection, Hassiba Ben Bouali University Chief Algeria. ⁶National Institute of Plant Protection Chief Algeria.

Abstract: The growing awareness of consumers concerning the relation between food and health is revolutionizing agriculture. Many naturally occurring compounds present in plants, herbs, and spices have been shown to possess antimicrobial effect against food borne pathogens. The development of bio-fungicides from aromatic plants as alternatives to synthetic fungicides is currently undergoing a large number of studies. *In vitro* studies are useful precursors for *in vivo* testing; allowing the identification of essential oils and establishes effective concentrations required for inhibition of mycelia growth from this perspective. The present study was conducted to evaluate the antifungal activity of essential oils extracted from leaves of *C. Limonum* and they were examined *in vitro* and *in vivo* vis-à-vis *Alternaria solani* agent Alternariose potato. The disk diffusion method was used to evaluate the inhibition of mycelia growth at various concentrations. The evaluation of antifungal potential of essential oil *in vivo* is estimated in three ways: direct contact, fumigation and spraying. The persistence of the oil was tested using three application modes: preventive, curative and at the same time. Chemical analysis of oils *C. Limonum* by GC / MS identified α-pinene (1.28%), limonene (36.10%), β-myrcone (2.55%), caryophyllene (1.65%), caryophyllene oxide (0.19%) *In vitro* the essential oil of *C. limonum*
exercised great power inhibitor of mycelial growth with PIC equal to 100%. The fungus was completely inhibited by an MIC of 0.05 mg / ml. Production and spore germination are strongly inhibited in the presence of oil compared to the untreated control. In-vivo oil C. limonum showed an antifungal effect against the fungus. She has an inhibitory effect on the appearance of disease symptoms (necrotic spots) and the percent inhibition of sporulation (PIs = 90%), if applied by spraying. The percentage inhibition of spore germination is about 19% to 33%.

**Key words:** Alternaria solani, C.limonum, GC / MS, essential oil, in vivo, in vitro.

9.5 Use of Extracts of *Cynara cardunculus* as Coagulating Agent of Different Types of Milk

Khreisat Nadjoua and Pr Choukri Ali

Organic chemistry laboratory and valorisation of natural substance, Ziane Achour university, Djelfa, 17000, Algeria.

**Abstract:** The cardoon has become important as a medicinal herb in recent years following the discovery of Cynarin, this better tasting compound, which is found in leaves, improves several functions. The flowers of cardoon are typically used in Algeria, for traditional cheese making of “Djben”.. The present study was carried out in order to study the aptitude of the cardoon to coagulate cow’s, camel’s, ewe’s and goat’s milks in the traditional cheese making. First, extraction carried out from flowers indicate a coagulating activity only with the flower collected at an advanced stage of development. The coagulant agent seems to show a greater affinity for the ewe’s milk where its action is found to be much better. The organoleptic characteristics of cheese performed with the four types of milk differs notably, particularly the consistency and the bitterness flavor in cow’s milk cheese. Second, extractions carried out from various parts of the plant, indicate a coagulating activity with the flower, and a low activity with receptacle. The results obtained suggest that some specific parameters shoul be revised such as NaCl concentration, and extraction time in order to characterise better this traditional cheese.

**Key words:** Cardoon, Cynara cardunculus, milk coagulation, vegetable coagulant.

9.6 Antioxidant activity of traditional food products based on fruits of black mulberry (*Morus nigra* L.)

Kucelova Lucia¹, Brindza Jan¹, Culakova Marcela ¹, Toth Dezider¹, and Sajbidor Jan²

¹Institute of Biodiversity Conservation and Biosafety, Slovak University of Agriculture, Nitra.
²Faculty of Chemical and Food Technology, Slovak University of Technology, Bratislava, Slovakia

**Abstract:** This experiment was conducted to determine the morphological, biochemical, technological and antiradical activities of the black mulberry fruit and related food products. In the experiments were used the fruits of selected genotypes of black mulberry populations grown in Slovakia. From the fruits was prepared and tested the juice, jam, jelly, syrup, liqueur, un-sterilized produce was overpoured by honey, among other products should be mentioned the tinned fruits, wine and cakes. Ability of these products to catch up DPPH⁺ (2,2-di-phenyl-1-picryl-hydrazyl) radicals was determined by spectrophotometry at 515 nm absorbancy in regular time intervals until the reaction equilibrium has been achieved. With tested genotypes was measured the fruit medium weight ranging from 7.26 g (genotype MN-1) to 1.42 g (MN-14), medium length from 13.51 mm (MN-14) to 29.20 mm (MN-12) and medium width from 11.88 mm (MN-14) to 21.12 mm (MN-2). Fully matured fruits produced 62.40 % of juice. In products was controlled the anthocyanins content ranging from 21.4 up to 106.4 mg.dm⁻³. The highest concentration of anthocanins was found in the black mulberry juice and the lowest one in the mulberry wine. Antiradical activity for individual samples ranged from 50.81 to 74.02 %. The highest antiradical activity was manifested in the case of mulberry fruit overpoured with honey and the lowest one again for mulberry wine. High values of antioxidant activity has been found for mulberry fruit cakes as well. In general, all tested samples exerted higher antioxidant activity in water extracts than in the ethylalcohol ones. Tested goods made of black mulberry fruits are used as traditional food
products. The applied mulberry fruit significantly increases the antioxidant activity, what has a positive effect on possible therapeutic impact on the consumers. Therefore the black mulberry is ranked among important species, which should be propagated and utilized in practice for phyto-therapeutic purposes.

**Key words:** Antioxidative activity, anthocyanins, food products, fruits, *Morus nigra*.

9.7 Effect of Dipping in GA$_3$ and Liquorice Root Extract and Storage Periods on Storage Characteristics of Pear cv. Le-Conte

**Nameer Najeeb F. and Esraa Abd Al-Ghani**
*Hort. Dept. College of Agriculture & Forestry, Mosul University, Iraq.*

**Abstract:** The experiment conducted on pear fruits cv. Le-Conte to study the effect of dipping pear fruits for 5 minutes in solutions of (Control, 100 and 200 mg. l$^{-1}$ GA$_3$ or 4 and 8 gm. l$^{-1}$ liquorice root extract, and two periods of storage (2 and 3 months) on fruit storage characteristics. After treatments the fruits were left to dry, put in perforated polyethylene bags and stored in cool room at 0±1°C and 85-90% r.h.. The experiment was factorial in Complete Randomized Design (C.R.D.), 2X6 (with 3 replicates and 7 fruits within each replicates). Results showed that, no significant differences appeared between dipping treatments of GA$_3$ and liquorice root extract and control treatment in total soluble solids, total acidity, sugar content and fruits contents of calcium and nitrogen, while dipping treatments in 100 and 200 mg. l$^{-1}$ GA$_3$ concentrations or one of them resulted in a significant reduction in fruits respiration and fruit decay percent, and retained fruit firmness. Also liquorice root extract treatments were effective in reducing fruit decay percent. Prolonging storage period from 2 to 3 months showed a significant reduction in total soluble solids, total acidity, sugar content and fruit firmness, but showed an increment in carotene pigment and fruit decay percent. Interaction between some treatments of GA$_3$ or liquorice root extract and storage periods resulted in a significant influence of some important storage characteristics like fruit firmness and fruit respiration and a reduction in fruit decay percent.

**Key words:** Pear fruit, root extract, liquorice, polyethylene.

9.8 Use of Thai local Vegetable Extracts as Natural Preservatives in Dried Sausage System

**Nanasombat, S., Armeen, W., and Arkom, O.**
*Department of Biology, Faculty of Science, King Mongkut’s Institute of Technology Ladkrabang, Bangkok 10520, Thailand.*

**Abstract:** Antioxidant and antimicrobial activity of Thai local vegetable extracts (3 formulations) at concentrations of 0.02%, 0.1% and 0.2% in a dried chinese-style sausage during storage at 4°C and 85% relative humidity (RH) for 20 days were evaluated. These formulations of the extracts were 1) the extract containing only *Polygonum odoratum* extract (PE), and the other two extracts were mixed vegetable extracts of formulation 1 (MVE$_1$) and formulation 2 (MVE$_2$) which were mixture of *P. odoratum*, *Cassia siamea*, *Garcinia cowa* and *Linnophila aromatic* extracts. All formulations of the vegetable extracts were able to delay lipid oxidation in the sausage. Addition of 0.2% vegetable extracts resulted in greater decreasing of TBARS value as compared to the other concentrations, but caused unacceptable color of the sausage. The extracts at all concentrations tested did not result in decreasing of their total viable counts (TVC). Therefore, these vegetable extracts at 0.1% were selected for use in combination with 2.5% sodium lactate (SL) as preservatives in this dried sausage. Their effects on oxidative, microbial and sensory stability of sausage samples during storage at 4°C and 85% RH for 21 days were evaluated. These extracts were able to retard lipid oxidation by lowering TBARS value throughout the 21-day storage. Addition of SL, either alone or in combination with these plant extracts resulted in decreasing
number of TVC in the samples. The TVC in the samples added with SL alone, PE with SL, and MVE\textsubscript{2} with SL decreased by 1.36, 1.35, and 2.42 log units after 21 days of storage. However, addition of vegetable extracts alone did not cause reduction of microbial counts in the sausages during storage. The sausage samples added with PE in combination with SL had less rancid odor compared to the samples of other treatments. Therefore, the vegetable extract, PE in combination with SL could be effectively used to extend shelf-life of the chinese-style sausage.

**Key words:** Antimicrobial, antioxidant, *Polygonum odoratum*, sodium lactate.

### 9.9 Antioxidant Potential of Some Medicinal Plants

**P.R. Venskutonis\textsuperscript{1,}, I. Šliumpaitė\textsuperscript{1,}, M. Murkovic\textsuperscript{2,}, and A. Zeb\textsuperscript{2}\**

\textsuperscript{1}Department of Food Technology, Kaunas University of Technology, Radvilnės pl. 19, Kaunas, LT-50254, Lithuania. \textsuperscript{2}Institute for Food Chemistry and Technology, Graz University of Technology, Petersgasse 12/2, A – 8010 Graz, Austria.

**Abstract:** Medicinal plants biosynthesize various compounds, including strong antioxidants, which may be used as a promising source of natural food additives and healthy functional ingredients. In this study radical scavenging activity of extracts isolated from such less investigated previously plants as *Betonica officinalis*, *Gratiola officinalis*, *Vincetoxicum lutea*, *Saponaria officinalis* and *Astragalus glycyphyllos* was evaluated using DPPH• and ABTS\textsuperscript{+•} radical scavenging assays. It was determined that the extracts from hedge hyssop (*G. officinalis*), wood betony (*B. officinalis*) and swallowwort (*V. lutea*) possessed the highest radical scavenging activity in both assays. Their antioxidant activity was much stronger than those of soapwort (*S. officinalis*) and wild liquorice (*A. glycyphyllos*). The content of total amount of phenolic compounds measured by Folin-Ciocalteu method correlated with the ability of plant extracts to scavenge free radicals. It was found that the highest amount of phenolic compounds were in the plant extracts which effectively inhibited DPPH• and ABTS\textsuperscript{+•} free radicals. The most active species *G. officinalis*, *B. officinalis* and *V. lutea* were selected for further studies, which were focused on phytochemical composition of the extracts as well as antioxidant activities of the separated constituents. An on-line HPLC-DPPH• method was used for this purpose. The technique enabled selective detection and identification of individual radical scavenging compounds without any prior off-line and time consuming chromatographic steps. It was determined that one of the main compounds possessing antioxidant activity in *B. officinalis* and *V. lutea* was chlorogenic acid. Moreover, the acetonic extract of swallowwort contained other 5 compounds, namely apigenin-7-O-glucoside, ferulic acid, cynaroside, luteolin-7-O-gentiobioside and quercetin-3-O-glucoside. The methanolic extract of this plant contained less compounds possessing antioxidant activity. Three compounds were identified in the mentioned extract, namely chlorogenic acid, isoquercetin and luteolin-7-O-gentiobioside. The identification of the chemical constituents from hedge hyssop was more complicated; however it was observed that the main compounds possessing antioxidant activity were hydrocinnamic acid derivatives. Furthermore, it was found that the extracts from wood betony contain these compounds as well. The identified constituents in wood betony were luteolin-7-O-glucoside, vitexin, luteolin-7-O-glucuronide and apigenin-7-O-p-coumaroylglucoside.

**Key words:** Antioxidant potential, medicinal plants.
9.10 The Importance of *Gentiana lutea* as Medical Plant for Herbal Supplemented Beverage

Razmovski N. Radojka, and Vučurović M. Vesna

Faculty of Technology, University of Novi Sad, Boulevard Cara Lazara 1, 21000 Novi Sad, Republic of Serbia.

**Abstract:** This study was conducted to analyse the importance and the potential of *Gentiana lutea* as medical plant for herbal supplemented beverage in Serbia. *Gentiana lutea* belongs to family of Gentianaceae, flowering plants comprising approximately 70–80 genera and 900–1200 species. This medical plant grows naturally on uncultivated ground in central and southern Europe including Balkan mountains. In Serbia it can be found on mountains as Zlatibor, Tara and Kopaonik (altitude of 300-2500 m). Gentiana lutea is an official drug in many pharmacopoeias and it is present commercially in the form of dried fermented rhizomes and roots. The root has antiseptic, anti-inflammatory, bitter, febrifuge, refrigerant and stomachic properties. These properties can be attributed mainly to secoiridoid bitter compounds, such as gentiopicroside, amarogentin, swertiamarin and group of xanthones such as isovitexin and isogentisin. Taking into account the anti-inflammatory and diuretic properties as well as different pharmacological activities of Gentiana extracts, it was desirable to explore and compare few different traditionally procedures for the production of herbal supplemented alcoholic beverages. There are several well known traditional procedures depending on ethno regions. The most widely used method include extraction of 30 g/l sliced fermented roots in 1 l grape brandy (45% v/v ethanol) or white wine during seven days. After filtration supplemented beverage should be stored in dark place until further use. This study aims at emphasizing the greatest importance of investigation of *Gentiana lutea* since there is a growing interest in the food industry and in preventive health care in the development and evaluation of natural healing agents from plants. This research is financed by Ministry of Science and Technological Development of the Republic of Serbia (Project TR-31002).

**Key words:** Gentiana lutea, medical plant, supplemented beverage.

9.11 Food and Medicinal Uses of Agave Sap Species in Western Mexico

Valenzuela, A. and Montiel, A.

Signo Tequila Foundation, Universidad de Guadalajara.

**Abstract:** Since Precolumbian times agave sap rich in sugars (honey-water) in Mexico, are a source for food, beverages, ferments, remedies and fibres. During Classic period of Aztec Culture, ebriety, nutrition and medicinal were assigned in a goddess complex and pulque (ferments). Codex form central Mexico and descriptions are evidences about man-agave simbiosis. The most important products were fresh juices from saps (honey-water or “aguamiel”) and their ferments (pulque). Tequila is a national liquor, very well known and produced in this region from *Agave tequilana*. Ethnobotanical research in agave species for saps has been scarce. From 2008 to 2012, we made 20 interviews, plant collects and species identification, crop systems classification, soils and weather types, uses as ferments, in gastronomy and medicinal remedies. How are the saps species and their cultivations patterns in Tequila land? Literature sources were reviewed and regional “pulque” history. Results showed differences in the agave saps species used in Jalisco, traditional knowledge and cultivation systems. We found two regions, with different species and production systems. The most intense cultivated system is represented by agave cultivars selected by asexually propagation. They are planted since XIX century with *A. americana*, *Americanae*, *A. salmiana* and *A. mapisaga* both Salmianae. Average total anual rain in this area is 500-600 mm with a soils diversity range. A second group is a wild and semi-domesticated production system of *A. inaequidens* and *A. hookeri* both Crenatae. They have a predominant sexual propagation, grown in volcanic soils (basalts), in mountains with pine and oak forest, total anual rain between 1000-1400 mm. Today, more medicinal and nutritional attributes are given to “aguamiel” and “pulque” and less for inebriation. This nutritious ferment 3-4% alcohol is recomended to mothers feeding, children, aged and sick people for a oligo-elements and aminoacids. Cooked juices from fresh leaves are used for tramautism, cicatrisants and cellular re-
hydratation. Aguamiel is cooked for a 45% brix syrup, remedy for cough and sweetner. Agave saps nutritional uses are re-valorised in Jalisco, this is the first empirical investigation identifying species, areas, cultivation and uses.

Key words: Agave sap, Jalisco, medicinal remedies, salmianae, tequila.

9.12 Traditional Use of *Juniper communis* L. Berries for Flavored Spirit Production in Serbia

Vučurović M. Vesna, and Razmovski N. Radojka
Faculty of Technology, University of Novi Sad, Boulevard Cara Lazara 1, 21000 Novi Sad, Republic of Serbia.

Abstract: Medicinal plants represent a valuable resource for alternative medicine and livelihoods of many people in Serbia. The rural communities and income generation rely on medicinal plants for their primary healthcare needs. The fruit of *Juniper communis* L. are commonly and traditionally used for production of juniper-flavored spirit in Serbia. In the production of traditional alcoholic beverages, juniper berries are used either as flavoring for grain and fruit spirit or as both fermentation substrate and flavoring agent. Various techniques have been used for juniper-flavored spirit production. Our study provides comparison of different techniques for juniper-flavored spirit. Each technique has particular advantages and disadvantages. Nevertheless, juniper-flavored spirit is most frequently obtained by addition of 10g dried mature berries in 1l of plum brandy (25% v/v ethanol) and storage for 40 days in the sunlight exposure. During that time aromatic, antioxidant and antimicrobial compounds are extracted. Then distillation of this plum brandy along with the berries of juniper is carried out. The obtained distillate is ageing in oak barrel for 3-6 months. Juniper-flavored spirit has been traditionally used in Serbia and others Balkan countries as diuretic, for disinfection of urinary organs, for improving digestion, expectorant, anti-gastric diseases, kidney diseases etc. The practical implementation of the selected technique presented in our findings could serve as a basis for further research in the field of the production of beverages with healing properties, with a view to developing new medicines for the treatment of the diseases of the modern times. This research is financed by Ministry of Science and Technological Development of the Republic of Serbia (Project TR-31002).

Key words: Juniper, juniper-flavored spirit, medical plant.
10.1 The Effect of Supplementing Different Levels of Fenugreek Seeds (Trigonella foenum– graecum) on Physiological Performance of Japans Quail (Cutornix-cutornix Japonica) Exposed to Oxidative Stress Induced By Hydrogen Peroxide

Ahmed T.Taha and Ahmed A. AL Douri
Animal resources dep./ College of Agriculture/ University of Tikrit/Iraq.

Abstract: The objectives of this study were to investigate the effect of oxidative stress induced by H2O2 (0.5%) supplemented with drinking water on the physiological performance of (cutornix-cutornix japonica) birds. In addition, the study aimed to evaluate the effect of fenugreek seeds in reducing this type of stress. Oxidative stress was assessed by measuring the levels of glutathione (GSH) and malondialdehyde (MDA) in the liver tissues and by monitoring the activities of GOT and GPT enzymes, as well as some physiological and hematological parameters. Sixty (Cutornix-cutornix Japonica) birds were randomly assigned into six treatments groups as follows: (control group T1) The birds were given standard diet and normal water. Treatment (2) The birds were given the same ration as treatment (1) and H2O2 (0.5%) in drinking water. Treatment (3) The birds were given a standard ration and 5 gm grounded fenugreek/Kg feed + H2O2 (0.5%) in drinking water. Treatment (4) The birds were given a standard ration +10 gm grounded fenugreek/Kg diet + H2O2 (0.5%) in drinking water. Treatment (5) The birds were given a standard ratio + 5gm grounded fenugreek/Kg diet + normal water. Treatment (6) The birds were given a standard ratio + 10gm grounded fenugreek/Kg diet + normal water. The result of study showed that H2O2 supplementation caused deterioration in the antioxidant status as represented by an increase in MDA and a decrease in GSH levels of the liver tissue. Significant increases (P≤0,05) in WBC, glucose, cholesterol and GOT, GPT enzymes activities blood serum. An improvement of the antioxidant status of liver tissue was evident in birds receiving fenugreek seeds as represented through an increase of GSH and decrease in MDA levels and significant increases (P≤0,05) in RBC, Hb, total protein concentration. It was concluded from the present study that supplementing (H2O2) resulted in an increase in the oxidative stress of (Cutornix-cutornix Japonica) birds; the fenugreek seeds have ability to reduce this type of oxidative stress.

Key words: Fenugreek, japans quail, hydrogen peroxide, oxidative stress.

10.2 Influence of Drinking Water Supplementation with Licorice Extract on Certain Blood Traits of Broilers during Heat Stress

Al-Daraji, Hazim J.
Department of Animal Resource, College of Agriculture, University of Baghdad, Baghdad, Iraq

Abstract: This study was conducted to determine the physiological mechanisms expected to be involved in alleviating the detrimental effects of heat stress on broiler chickens by supplementing drinking water with licorice extract (LE). A total of 600 broiler chicks, one day old were used. Birds have been assigned to 4 treatment groups with 3 replicates of 50 chicks each (150 chicks per treatment). Birds in the first treatment (T1) were provided with drinking water alone and considered as a control group, whereas birds in treatments 2 (T2), 3 (T3) and 4 (T4) were provided with drinking water supplemented with 150, 300 or 450 mg LE / liter, respectively. At the third week of age, birds in all treatments were exposed to heat stress (38 – 43 °C) for 6 hours daily (1200 h – 1800 h). Hematological traits included in this study were: Erythrocyte counts (RBC), hemoglobin concentration (Hb), thrombocyte counts (Thr), leucocyte counts (WBC), heterophil / lymphocyte ratio (H / L ratio), hematocrit (pcv) and plasma uric acid (Uri), glucose (Glu), cholesterol (Cho), Protein (Pro), aspartate aminotransaminase activity (AST), alkaline phosphatase activity (ALP), calcium (Cal) and phosphorus (Pho). Results revealed that inclusion of the LE in the drinking water of broiler chickens (T2, T3, and T4) exposed to heat stress resulted in significant (p < 0.05)
increase in RBC, Hb, Thr, WBC, PCV, and plasma Uri, Glu, AST, ALP, Ca and Pho and significant (p < 0.05) decrease in H / L ratio, and plasma Cho and Pro compared with (T1). However, T4 recorded the best results with relation to all blood characteristics included in this experiment. It was concluded from this study that supplementation of LE particularly at the level of 450 mg / liter to the drinking water of broiler chickens exposed to heat stress can depress the adverse effects of heat stress on blood characteristics of broiler chickens. Therefore, LE can be used as an effective feed additive for enhance general physiological status of birds during heat stress.

Key words: Broiler, erythrocyte, heat stress, licorice extract, plasma, thrombocyte, water.

10.3 Effect of Garlic Oil Supplementation on Laying Hens Fed with T-2 Toxin Contaminated Diet

Ancsin Zsolt, Erdélyi Márta, Balogh Krisztán, Bíocsai Andrea and Mézes Miklós
Department of Nutrition, Faculty of Agricultural and Environmental Sciences, Szent István University, H-2103 Gödöllő, Hungary.

Abstract: The aim of present study was to investigate whether garlic essential oil, with natural organosulfur compound content, that possesses free radical scavenging activity, is able to eliminate the adverse effects of T-2 mycotoxin contamination in laying hens’ diet. Hens were divided randomly into three treatment groups: Control (C), Control + T-2 toxin (T) and Control + T-2 toxin + Garlic essential oil (GT) (n=15 in each group). The Control group (C) was fed with commercial broiler diet without added antioxidants (basal diet). In the case of group T the basal diet was experimentally contaminated with T-2 toxin with a dosage of 2.05 mg/kg feed. In group GT the feed of T group was complemented with 0.30 g/kg feed garlic essential oil. Experimental diets were fed for 21 days. During this period, the egg production was recorded daily, and egg samples for quality measurements were taken on weekly basis. On day 21 five randomly selected birds from each group were exterminated, and blood, liver, muscle, kidney and spleen samples were taken to determine the concentration of malondialdehyde (MDA), as meta-stable end product of free radical initiated lipid peroxidation, and that of the reduced glutathione (GSH), the most important sulphhydryl containing low molecular weight antioxidant, as well as the activity of glutathione peroxidase (GPx). There were no significant changes in egg production and in the biochemical parameters of blood samples. However, significant changes were found in egg quality parameters as we measured, such as significantly lower egg-length (p<0.01), egg-weight (p<0.001), egg shell thickness and weight (p<0.001) in group T as compared to the control group. Contrary to this, in group GT not just significantly higher (p<0.001) egg-length, egg-weight, egg-shell thickness and weight were measured as compared to group T, but egg-length (p<0.01) and egg weight (p<0.001) were significantly higher compared to the Control group, as well. Furthermore, in the muscle, kidney and spleen samples of group GT, significantly lower MDA contents were measured as compared both to the mycotoxin treated (T) and the control group (p<0.001). Our results suggest that 0.30 g/kg feed garlic essential oil not just successfully eliminated the adverse effects of 2.05 mg/kg feed T-2 toxin contamination, but in contempt of this pro-oxidant challenge it was still able to ameliorate the egg-weight.

Key words: broiler, contamination, essential oil, garlic, malondialdehyde, organosulfur, spleen.
10.4 Comparative efficacy of various indigenous and allopathic drugs against fasciolosis in buffaloes

Azhar Maqbool, and S. Shakeel Shah

Department of Parasitology, University of Veterinary and Animal Sciences, Lahore, Pakistan.

Abstract: One hundred and eighty buffaloes were used in 18 controlled experiments to compare the efficacy of certain indigenous drugs, including Nigella sativa seeds, Fumaria parviflora aerial parts, Caesalpinia crista seeds, and Saussurea lappa roots with triclabendazole against fasciolosis. Efficacy was quantified by determining the difference of eggs per gram faeces (EPG) pre- and post-treatment. Nigella sativa seeds, after a single dose of 30, 40 and 50 mg/kg body mass, reduced EPG by 54.16, 57.4 and 58.33 per cent. After the second dose the respective reduction in EPG was 79.16, 80.85 and 81.25 per cent. Fumaria parviflora aerial parts at the rate of 40, 50 and 60 mg/kg body mass were 50.0, 57.44 and 78.72 per cent, respectively, whereas efficacy at two dose levels with the same dose rate was 82.6, 89.36 and 95.74 per cent, respectively. Caesalpinia crista seeds at 30, 40 and 50 mg/kg body mass were 48.9, 50.0 and 57.7 per cent effective, respectively, whereas efficacy at two dose levels was 80.0, 84.09 and 86.6 per cent, respectively. Saussurea lappa at a rate of 50, 100 and 200 mg/kg body mass was 46.6, 57.4 and 61.7 per cent effective, respectively, at one dose level and was 62.2, 72.3 and 78.7 per cent effective at two dose levels. Triclabendazole at one dose level at a rate of 10 mg/kg body mass was 82.6 per cent effective and at two dose level it was 95.7 per cent effective. The efficacy order was triclabendazole, Fumaria parviflora, Caesalpinia crista, Nigella sativa and Saussurea lappa. No side effects were noted due to the use of any of these plant-origin drugs.

Key words: Buffaloes, efficacy, eggs, Nigella sativa, Saussurea lappa, triclabendazole.

10.5 The effect of phytogenic additive on in vivo saccharides digestibility of sport horses

Galik Branislav¹, Biro Daniel¹, Rolinec Michal, Simko Milan¹, Juracek Miroslav, and Halo Marko²

¹Department of Animal Nutrition, Slovak University of Agriculture. ²Department of Animal Husbandry, Slovak University of Agriculture, in Nitra-Slovakia.

Abstract: This study was conducted to determine the effect of plant extract additive on digestibility of nitrogen free extract, crude fibre, NDV and ADV in sport horses nutrition. 14 adult healthy warm blood sport horses were used (BW: 525±75 kg, Age: 6.8±3 Years). Animals were divided in two groups (7 horses in each group): control group C and experimental group A. Feed rations of sport horses were formulated from crimped barley, meadow hay and mineral feed mixture. Feed rations of horses in experimental group were added with phytogenic additive (active compounds: a blend of essential oils from origanum, anise and citrus fruits, as well as a prebiotic rich in fructooligosaccharides) in dosage 1g per 1 kg of concentrated feed. Two months after the beginning of experiment we realized in vivo digestibility trial. During the experiment any metabolic problems were observed. Significantly (P<0.05) higher digestibility of nitrogen free extract was found in experimental group of horses, which were fed by rations added with plant extract. The average digestibility coefficient of nitrogen free extract was 76.07% (control group) and 80.08% (experimental group). In crude fibre we found significantly (P<0.05) effect of feed rations plant extract addition. In control group of sport horses we found statistically lower in vivo digestibility coefficient (47.29%) in comparison with experimental group (51.61%). In experimental group of horses were feed rations supplemented by plant extract (active compounds mixture of essential oils and fructooligosaccharides). Significant (P<0.05) higher NDF digestibility we detected in experimental group of horses in comparison with control group (47.35 vs. 42.41%). Digestibility coefficients of ADF were significant (P<0.05) higher in experimental group; average coefficient in control group 31.90% and in experimental group 37.45% respectively. In the experiment we found significant effect of aromatic plants extract on faecal digestibility of saccharides. After the additive feeding we found higher apparent digestibility of sport horses. Therefore, aromatic plants extract can be used in horses nutrition as additive for feed nutrients utilization increasing.

Key words: Additives, apparent digestibility, crude fibre, equine, nutrition, nitrogen free extract.
10.6 Effect of Supplementation Powder and Aqueous Extract of Rice *Oryza sativa* Bran to Diet and Drinking Water During Heat Stress on Broiler Performance

**Ibrahim, Dhia**¹ and **Butris, Ghassan**²

¹College of Agriculture, Baghdad University. ²College of Veterinary, Baghdad University, Iraq.

**Abstract**: The aim of this study was to investigate the effect of supplementing powder, aqueous extract of rice bran to diet and drinking water on broiler performance exposed to cyclic temperature 28-35-28°C. One hundred and twenty-one day old unsexed Lohmann broiler chickens were used, reared on litter to 3 weeks of age, and from 4-8 weeks reared in batteries, birds fed a diet containing 21.13% crude protein and 2978.58 Kcal ME/ Kg diet and, five treatments were carried out T₀ treatments without addition of rice bran, and T₁, T₂ treatments where addition of rice bran aqueous extract to drinking water was at level 0.3, 0.9% respectively and T₃, T₄ treatments where addition of rice bran powder to diet was at level 0.3, 0.9% respectively. This supplementation of rice bran to diet and drinking water was given to broiler daily for 6 hours from 1200-1800 hours which the highest environmental temperature 35°C during experiment periods 4-8 weeks of age. In general the results of addition rice bran to diet and drinking water revealed a significant (P<0.01) increase in live body weight, feed consumption, weight gain at 8 weeks of age in some treatments compared with T₀. However mortality percentage decreased in all treatments compared with T₀, while no significant effects in feed efficiency ratio and growth rate, meanwhile there were some significant decrease in feed consumption pattern in some treatments compared with T₀ while water consumption pattern increased especially in the hot periods of a day at 1200, 1500, 1800 hours, also body temperature significantly decrease compared with T₀ in the same periods. We concluded from this study that addition rice bran as powder or aqueous extract has a benefit effect in reducing the harm effects of heat stress.

**Key words**: Aqueous, broiler performance, extract, heat stress *Oryza sativa* bran, Powder.

10.7 Successes and Failures in Developing Plant Based Products to Promote Animal Health and Productivity.

**JN Eloff**

Phytomedicine Programme, Faculty of Veterinary Science, University of Pretoria, South Africa.

**Abstract**: Plants contain many compounds that could be useful in increasing animal productivity. Rural communities have been using plant extracts to treat animal diseases for many years. Most scientists have used traditional leads to select plant species used for certain indications. In our experience this approach did not work well in the case of microbial infections. The reason is because in practically all cases the antimicrobial compounds we isolated were too non-polar to be extracted by water, the only extractant widely available to rural people. In the Phytomedicine Programme leaf extracts of more than 600 tree species have been screened for activity against six bacterial and two fungal pathogens. After selecting a plant species based on the random screening results, a crude extract was developed that was as active as the current commercial product in protecting poultry against *Aspergillus fumigatus* infections. We were also able to establish a plant based product that was better than gentamycin in protecting animal wounds from topical infections. Work on replacing antibiotic feed additives with plant extracts gave varying results. On the other hand traditional leads were very useful when we developed products to treat animals against diabetes, to protect animals against fly larvae that cause myiasis and to protect animals against ticks. Substantial work with varying success was also done on treating helminth infections and investigating diarrhoea in animals. In many cases the crude extracts had activities close to that of the isolated compounds. It appears that using plant extracts therefore is a much more feasible approach than using the active compounds. Focussing on antifungal activities may be useful approach to develop products with a commercial potential. In this I will discuss our results in combating ectoparasites, endoparasites (mainly helminths), insects (blowflies) fungi, bacteria and viruses in different applications.

**Key words**: Animal health, developing, plant based products, promotion, productivity.
10.8 Effect of Rhus coriaria L. in Rabbit Nutrition on Spermatozoa Motility

Massanyi Peter¹, Abbas Kamaran², Danko Jan³, Formicki Grzegorz⁴, Stawarz Robert⁴, Rzepka Andrzej⁴, Dlugosz Zbigniew⁴, and Lukac Norbert¹

¹Slovak University of Agriculture, Nitra, Slovak Republic; ²Salahaddin University, Erbil, Iraq; ³University of Veterinary Medicine and Pharmacy, Kosice, Slovak Republic; ⁴Pedagogical University, Krakow, Poland.

Abstract: Rhus coriaria L. is a deciduous shrub to small tree in the Anacardiaceous or Cashew family, native to southern Europe. The dried fruit are used as a spice, particularly in combination with other spices. The aim of this study was to investigate the effect of sumac (Rhus coriaria L.) addition to the diet on spermatozoa motility parameters of male rabbits. Adult rabbits (5 in each group) were divided into 5 groups – control (C) and four experimental groups. Experimental animals received sumac per os in feed in various doses: E1 – 0.50%, E2 – 0.75%, E3 – 1.0% and E4 – 1.50% for 90 days. During the consumption of the sumac the spermatozoa motility was analyzed using CASA system. At the end of the experiment the analysis of the total spermatozoa motility detected a decrease of spermatozoa motility from 74.68% in control group to 61.48 % in group with the highest sumac concentration in feed mixture. Similar tendency of decrease was detected also for progressive spermatozoa motility, where the decrease reached almost 20%. Motility spermatozoa parameters closely correspond with path parameters of spermatozoa motility. The highest distance average path was found in control group (19.55±8.04 μm) and the lowest in group with addition of 1.0% sumac (15.89±9.63 μm). Distance curved path (line) was in control group 41.11±15.43 μm and the decreased in the group E3 was the most significant – 31.07±18.68 μm. Similar tendency was detected also for distance straight line – a decrease from 13.79±5.60 to 11.91±7.50 μm. Also the other fine parameters of spermatozoa motility: velocity average path, velocity curved line, velocity straight line, straightness, linearity, wobble, amplitude of lateral head displacement and beat cross frequency were lower in groups with addition of sumac in feed mixture. Generally, results of the study suggest negative effect of sumac on spermatozoa motility parameters which might be in relation to decreased cholesterol concentration as reported before. Supported by VEGA 1/0532/11.

Key words: Rabbit nutrition, Rhus coriaria, spermatozoa motility.

10.9 Phyto-Ethnoveterinary Medicines of Northern Himalayas

Mushtaq Ahmad, Ghulam M. S., Mir Ajab K., Muhammad Z., and Shazia S.
Department of Plant Sciences, Quaid-i-Azam University Islamabad Pakistan

Abstract: The Mountains of Northern Himalayas are endowed with a diverse plant wealth. It is the home of rare species of plants and animals. An ethnobotanical survey was conducted for documentation of medicinal plants used to cure different veterinary ailments. In this region nomads and other migratory herders utilize herbal medicines for the treatment of their livestock. Data was collected based on questionnaires and interviews of herders, nomads and shepherds. A total of 62 plant species belonging to36 families were identified against veterinary ailments. Typically 7-10 types of diseases were reported in study area. The most frequent diseases are diarrhea, after birth retention, prolapsed of uterus, constipation, fever, foot and mouth rot, colic, indigestion, blood in urine, internal injury and fever etc. Further research trials are needed to confirm the efficacy of these veterinary herbal drugs.

Key words: Ethnobotany, flora, northern himalaya, veterinary diseases.
10.10 Medical Plant *Tribulus terrestris* as Additive in Animal Nutrition

Petkova Mariana and Grigorova Svetlana

Institute of Animal Science Kostinbrod, 2232 Bulgaria.

**Abstract:** The extract from the annual herb *Tribulus terrestris* L. (TT) is extremely rich in biological active substances such as furostanol saponins, flavonoids, alkaloids, glycosides, vitamins and other constituents in general. It is commonly used in the folk medicine of many countries for different purposes because of its anticancer, antimicrobial, anti-helminthic, anti-fungal, and antiviral effects. However, Bulgarian product, in comparison with those from other origin (China, India, America, Japan, Korea etc.), contents more saponins of the furostanol type: protodioscin and protogracilin which are the main active components of this medical plant. The objective of this paper is to review and analyze the results of studies with animals received as additive of products from *Tribulus terrestris* by feed or water. Recently, experiments with various farm animals (rams, poultry, rabbits, bulls) proved the beneficial effect of TT dry extract on: productivity; sperm quality; biochemical changes of blood parameters and qualities of meat and eggs. The paper presents also the review of results from our own investigations. It was found that the tested product increased the laying intensity of hens (P≥0.05), quails (P≤0.001). Egg morphological characteristics as well as sperm quality of rams, cocks and bulls are improved under treatments. The addition of TT dry extract leads to decreasing of blood serum cholesterol in hens and cocks (P≥0.05), in quail (P≤0.01). The concentration of glucose in the blood serum was high significant lowered (P≤0.001) in hens, quails and bulls. The level of Ca blood serum increased (P<0.01) only in female experimental birds (guinea fowls and hens). Additionally, in growing rabbits received TT extract, we observed enhancement of the average daily gain, carcass performance and meat chemical composition, dependent on the sex of animals and the level of additive. The supplementation of the TT dry extract does not influence negatively on the sensor properties of table eggs. The blood testosterone level in bulls was significant higher (P< 0.01) at the end of treatment in relation to the level at the beginning of investigation. We made conclusions for beneficial effects of medical plant *Tribulus terrestris* and the possibilities for using its products in animal nutrition. The proper concentration in the daily rations and the concentrate mixtures are also given.

**Key words:** Animal, biological active substances, extract, nutrition, *Tribulus terrestris* L..

10.11 Herbal Medicine for Animal Health in the Region of Central Slovakia

Poracova, Janka¹, Blascakova, Marta¹, Kotosova, Janka², and Sedlak, Vincent²

¹Department of Biology, Excellence Centre of Human and Animal Ecology, Presov University in Presov. ²Department of Ecology, Presov University in Presov, Faculty of Humanities and Natural Sciences, Presov, Slovak Republic

**Abstract:** In the last few decades rise the interest and use of herbal medicinal products, plant material or its crude extracts in the human and veterinary medicine. This general interest has been followed by increasing scientific and commercial interest in traditional medicines. This work’s focused on finding medicinal plants that are most used for digestive disorders, skin, and inflammatory respiratory diseases in animals in Central Slovakia. By questionnaire inquiry we investigated the use of medicinal plant species in animals in the region of Central Slovakia – Banska Bystrica and Zilina regions. We asked 256 respondents who answered questions concerning the use of medicinal plants for various diseases of domestic animals, especially in diseases of the digestive tract, skin diseases and injuries, inflammatory respiratory diseases. Many plant extracts, essential oils, teas and other preparations are used in our country at diseases of economically important domestic animals or pets. Dandelion (*Taraxacum officinale* L.), coriander seed (*Coriandrum sativum* L.), lemon balm (*Melissa officinalis* L.), onion (*Allium cepa* L.), yarrow (*Achillea millefolium* L.), yellow gentian (*Gentiana lutea* L.) and others are especially used for treatment of the digestive problems in animals in Central Slovakia. For the treatment of skin diseases are used ribwort plantain (*Plantago lanceolata* L.), St. John’s Wort (*Hypericum
perforatum L.), sage (Salvia officinalis L.), purple coneflower (Echinacea purple L.), greater celandine (Chelidonium majus L.), stinging nettle (Urtica dioica L.). The inflammatory respiratory diseases in animals are treated mainly with red clover (Trifolium pratense L.), thyme (Thymus serpyllum L.), coltsfoot healing (Tussilago farfara L.), ribwort plantain (Plantago lanceolata L.), pansy (Viola tricolor L.) and fennel (Foeniculum vulgare L.). Use of plant extracts and essential oils is widespread throughout the region of Central Slovakia. Mainly are represented the plants that are commonly growth in this part of Slovakia, which are used in relation to traditional medicine known in this area.

Acknowledgements: This work was based on a project supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, project number 00162-0001 (SR-3634/2010-11 ME) and the Agency of Structural Found EU, project: ITMS 26220120041.

Key words: Dandelion, essential oils, medicinal plant, veterinary, sage, Slovakia.

10.12 Ethnoveterinary Medicine in the Region of Eastern Slovakia

Poracova, Janka¹, Blascakova, Marta¹, and Sedlak, Vincent²
¹Excellence Centre of Human and Animal Ecology, Presov University. ²Department of Ecology, Presov University in Presov, Faculty of Humanities and Natural Sciences, 081 16 Presov, Slovak Republic.

Abstract: As far as the industrially development countries are concerned, intensive farming has been widely practiced but had raised not only food production, but also many ethical and health concerns, giving rise to the organic preference of many consumers. The investigation of the traditional natural medicines might provide alternatives to current treatments of animals that have caused much concern such as widespread use of antibiotics in young animals, producing residues in food and creating of resistance in humans and animals. In our work we focused on finding medicinal plants that are most used for digestive disorders, skin diseases, respiratory diseases in domestic animals in region of Eastern Slovakia. The results were processed on the basis of the responses which we received from 425 respondents in the Presov and Kosice region. We tried to find which kind of herbs is used in diseases of domestic animals in Eastern Slovakia. Plants and their extracts are commonly used for skin diseases and injuries, diseases of the digestive tract and respiratory tract. The mainly used medicinal plants by digestive problems in animals in Eastern Slovakia are dandelion (Taraxacum officinale L.), yarrow (Achillea mellefolium L.), lemon balm (Melissa officinalis L.). In case of skin diseases and wound healing in animals using stinging nettle (Urtica dioica L.), ribwort plantain (Plantago lanceolata L.), sage (Salvia officinalis L.) and greater celandine (Chelidonium majus L.). In case of respiratory diseases in animals used thyme (Thymus serpyllum L.), clover (Trifolium pratense L.), Fennel (Foeniculum vulgare L.) and healing coltsfoot (Tussilago farfara L.). We found that most respondents used in the treatment of selected diseases of animals the plants, which are located in the region and have been used in traditional medicine in this part of Slovakia. In recent years are beginning to use the new plants, which were introduced from other countries in Europe, Asia ect.

Acknowledgements

This work was based on a project supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, project identification number 00162-0001 (SR-3634/2010-11 ME) and The Agency of Structural Found, code project: ITMS 26220120041.

Key words: Dandelion, medicine, sage, Slovakia, veterinary.
10.13 Mahout Community – An Indigenous Knowledge Tresasure of Medicinal Plants Used in The Healthcare of Domesticated Elephants of Maharashtra, India

**SALUNKHE CHANDRAKANT B.**¹ and **MOHOLKAR SUHAN M.**²

¹Post Graduate Center of Botany, Krishna Mahavidyalaya, Shivnagar, Rethare (Bk.). ²Raja Shripatrao Bhagwantrao Mahavidyalaya, Aundh – 415510, M.S., India.

**Abstract:** In India, The Project Elephant presently covers 25 Elephant Reserves in 14 States spread over 61,200 km² of National Parks and Sanctuaries and areas used by elephant outside. Major aim of The XI Five year plan of Project Elephant is the long-term conservation of viable elephant populations. In the Royal families and some temples, elephants have been domesticated and used as status symbols since time immemorial. It is estimated that about 4000 elephants are in captivity in India. The majority (i.e. about 2700) are under the care of private individuals. Once a captive elephant is weaned, it begins life as a domesticated elephant under the care of its keeper ‘Mahout’. Very little attention has been paid to the management of the large population of these captive elephants in the country. There is an urgent need to pay more attention for welfare of this intelligent animal, who has shared a close relationship with people for several thousand years. The Mahouts have sound knowledge of nutrition and herbal remedies to cure various diseases of domesticated elephants. This traditional knowledge of Medicinal plants is unique to the community and has been passed from generation to generation, usually by word of mouth and cultural rituals. It forms the basis of health care of domesticated elephants. 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 little-known bioresources of potential economic value is very much essential. For the last 3 years (2009-2011), the data on medicinal plants used for domesticated elephants was obtained through interviews with Mahouts of Maharashtra state in India. Present paper highlights some herbal preparations used by Mahouts to cure various diseases in domesticated elephants. An extensive literature review and botanical identification of the plants was done with available literature. The preserved specimens were deposited in the herbarium of Krishna Mahavidyalaya, Shivnagar, Rethare Bk.,(MS).

**Key words:** Elephants, india. indigenous knowledge, maharashtra, mahout.

10.14 Effect of Addition Different Levels of Caraway Seeds Powder on Performance, Some Physiological Traits and Immunity to Broiler Chicken

**Sunbul J. Hamodi and Hanan I. Al-Mashhadani**

*Department of Animal Resources / Faculty of Agriculture / University of Baghdad. Iraq.*

**Abstract:** This study was conducted at Poultry Farm, Animal Science Department, College of Agriculture, University of Baghdad from 28/3/2011 until 9/5/2011 to evaluate the supplementation of different levels of caraway seed powder on the performance, some physiological and immunity traits and microorganism count to broiler chicken. A total of 180 day-old Ross-308 chicks were randomly assigned to four treatments with three replicate pen/treat. (15 chicks/replicate). Birds were fed experimental diet containing 0% T1 control and 1, 2, 3 gm caraway seed powder/kg diet for treatment T2,T3,T4 respectively. The results showed that there was a significant increase (p<0.05) in final body weight, weight gain, feed consumption and significantly (p<0.05) improved in feed conversion ratio for treatment 2 and 3 as compared to T1 and T4 . The concentrations of cholesterol, triglycerides, low density lipoprotein, glucose and uric acid (mg/100ml blood serum) decreased significantly (p<0.05) in all treatments supplementing caraway seed powder, whereas no significant differences in total protein , albumen, globulin and enzyme activity AST, ALT between treatments. Significant reduction in *E. coli* bacterial count for treatments 3 and 4 compared with control group, while Lactobacilli bacterial count increased significantly in T2 compared with other treatments. Cellular immunity improved significantly (p<0.05) after 48hr from injection to T2 compared with T1 and T4 also the length and width of Bursa Fabricia gland increased significantly in T3 than the other treatments. We can conclude from this experiment that the best level from caraway seed powder that can be used in broiler ration to get a good results in all traits in this study was 2 gm / kg diet.

**Key words:** Broiler, caraway seeds, physiological traits, productivity traits.
10.15 Comparative Supplemented Vitamin C and Roselle Flower to Broiler Diet on Productive Performance

Sunbul, J. Hamodi¹, Luma, K. Bander¹, Firas, M. Al-Khilani², Raad, F. Hamed²

¹College of Agric. Baghdad Univ. ²State Board of Agric Res. Ministry of Agric. Baghdad – Iraq

Abstract: This experiment was conducted at poultry research station, State Board of Agricultural Research Ministry of Agriculture from 1/7 to 11/8/2010. To study the effect of supplemental Vit.C and Roselle in broiler diets on productive performance 540 day old unsexed broiler chicks (Arbore Acres) were used in this study. The supplements were randomly distributed into 3 treatments. Control, Vit.C (250gm /ton) and Roselle (6kg/ ton) for 6 replicate (30 chicks per replicate e). Body weight (gm)-gain(g)-feed consumption-feed conversion ratio - mortality- dressing percentage-giblets and carcass cuts were studies. The result showed that supplementing Vit.C and Roselle flower studies to the diet increased significantly (p<0.05) in productive performance. Supplementing Roselle flower to the diet increased significantly (p<0.05) body weight - weight gain - feed conversion ratio and decreased mortality compared with Vit.C and control groups, so that results revealed by production index , also productive performance improved in Vit.C treatment compared with control group. Dressing percentage and carcass cuts (thigh , drumstick and breast) increased significantly in Roselle flower treatment than the other treatments.

Key words: Broiler diet, productive performance, roselle flower, vitamin c.
A. DJEBARA (66)
A. John De Britto (108)
Abbass, J. A. (102)
Abu-Dahab, R. (1)
Adrar, Sabah (2)
Afifi, Fatma U. (54)
Aftab, A. (66)
Agah Fateme (95)
Ahlam Hachelaf (67)
Ahmad El-Oqlah (27)
Ahmad Habib (95)
Ahmed T. Taha (139)
Aisha M. A. Ahmed (96)
Akkal, S. (82)
Al - Daraji, Hazim J. (139)
AL-Hadeedy S.H. (97)
Al - Rubeii, Amera M. S. (132)
Al - Soub, Razan (3)
Alghamdi, Salem S. (132)
Aljibouri Abedaljasim M. (96)
Alli Inteaz (67)
Almalty Abdul-Majeed (54)
ALOUANI, Abdelouaheb (108)
Alsabri Sami (3)
Amar DJERIDANE (4)
AMMAD Faiza (109)
Amro, Mohamed A. (109)
Ancsín Zsolt (140)
Angelova, V. (125)
ARRAR Lekhmici (68)
Ashrafju, Mahla (111)
Asiyeh Salari Sabzevara (110)
Askarianzadeh A. (110)
Asma Chbani (111)
Azhar Maqbool (141)
Azza, A. Ezz El-Din (100)
BABA-AISSA M. Karima (112)
Bachir Raho Ghalem (133)
Badiaa Lyoussi (5)
BAHLOULI Fayçal (123)
Baniadami Yekta (112)
Baranova Inna (128)
Basri Dayang Fredalina (6)
Bedjou, fatiha (7)
Belattar, R. (121)
BELGUENDOUZ, R. (7)
Eftimova Jarmila (58)
EL Tahir A (16)
Erdoğan Elif (34)
Éva Žámboriné –Németh (97)
F. Guenadil (129)
F. Louafi (75)
Fayha M. AL-Hawamdeh (98)
Firas alkazak (17)
Foudil-Cherif Yazid (75)
Ghasem Hosein Talaei (99)
Grubnik Igor (129)
Grygorieva Olga (75)
Haba Hamada (76)
Hadieh Bahaa (18)
HADJAJDI-BENSEGh Fatiha (59)
Hakim, kheniche (18)
Hakimeh Najmizadeh (115)
Hamdani Fatima zohra (133)
HAMMOUDI Roukia (19)
Haouala Faouzi (113)
HARFI Boualem (99)
Harir Mohamed (116)
Harkati Brahim (19)
Harzallah, Daoud (13)
Hashmi R. S. (100)
Hassan Abdalla Almahy (76)
HENCHIRI C. (20)
Hohmann, Judit (20)
Huber, Franz K. (122)
Huda Hazim Al-Taae (116)
Ibrahim, Dhia (142)
Isabel Maria Madaleno (101)
Ishak, Shafariatul Akmar (21)
Jasim Abdul razzak, A. (101)
JN Eloff (142)
KAABOUR Faiza (21)
Kacharava Tamar (126)
Kadan Sleman (22)
Kamel Medjroubi (77)
Kanagarajan Prasanna K. (117)
Karadjva Irina (126)
Kasabri, Violet (60)
Kchouk Mohamed Elyes (8)
Khalid A. Khalid (101)
Khelifi Lakhdar (68)
KHENNOUF Seddik (22)
Khoo, Kong Soo (23)
Khreisat Nadjoua (134)
Kitancharoen, Nilubol (24)
Korecova Marta (24)
KRAOUCHE Née KHEYAR N (25)
Krasteva Ilina (77)
Kučera, Miroslav (25)
Kyslychenko O. (78)
Kyslychenko, Viktoriia (78)
L. Benmekhbi (79)
Laib Yasmina (26)
Laila Sasi Younes (102)
Laouer Hocine (26)
LARIBI Bochra (80)
Leila Radhouane (27)
Luma, K. Bander (147)
M. Beghalia (28)
M. Hmamouchi (80)
M. Ramdani (81)
Mahajna Shihnaz (28)
Mahmoud Khourang (103)
Majid Amini Dehaghi (103)
Masalha Mahmoud (2)
Masomeh Mohammd (104)
Massanyi Peter (143)
Matthias Lorenz (81)
Mebarki lakhdar (117)
MEDDOUR, Rachid (61)
Mehani mouna (29)
Mekhaldi, A. (82)
Mekkiou R. (82)
Merghem Mounira (30)
Meriem DJARMOUNI (30)
Merzouk H. (31)
Meybeck alain (31)
Mezaache-Aichour Samia (32)
Mezghani Sana (33)
Milijić, Uroš (130)
Mohamad Shatnawi (33)
Mohamed BENALAI (34)
Morsli, A. (104)
Mostefa sari, F. (35)
Moussa Brada (35)
MOUSSAOUI Kamel (83)
Muhammad Zafar (61)
Muñoz–Mingarro Dolores (84)
Mushtaq Ahmad (143)
N. Gourine (35)
Nada S. Othman (118)
Nadia BENZIDANE (36)
Nameer Najeeb F. (135)
Nanasombat, S. (135)
Narimane Seguen (36)
Nimmannit Ubonthip (9)
Nipon Pisutpaisal (85)
Nouioua W. Kaabeche M. (37)
O. BOUMAZA (85)
Ochocka J. Renata (2)
Osman N.A.A. (131)
OUAFI S. (37)
Oukil naima (38)
Ozturk Munir (122)
P. R. Venskutonis (136)
Paranhos, A. (105)
Pavlova Dolja (127)
Petkova Mariana (144)
Petpiroon, Nareerat (38)
Poracova, Janka (39)
Purhemati, Amin (43)
Puškaš, Vladimir (130)
Qaragholi, Zena M.F. (40)
QURESHI, R. (62)
R. A. Mandour (17)
R. Jeyachandran (40)
R. Sahraoui (86)
RAMDANE F. (86)
Razmovski N. Radojka (137)
Rudolf Bauer (41)
Sabah BOUMERFEG (86)
Saddam Aref Al-Dalain (105)
Saffidine Karima (41)
Saifan S. (123)
Saja Hamed (62)
Salamon Ivan (87)
Salari, Elham (118)
Salhi Nesrine (119)
Saliha Dahamna (42)
SALIMA SEBAIHI (87)
SALUNKHE CHAN. B. (146)
Sarah Sallon (63)
SARI Madani (63)
Sawsan A. Oran (124)
Schmidt Mathias (88)
Sedlak, Vincent (145)
SELLAL, A. (42)
Senator Abderrahmane (43)
Senthilkumar Subburaman (45)
SERSOUB D. (64)
Shahina A Ghazanfar (124)
Shalaby A. Mostafa (46)
Sharaf Omar (46)
SHARAF-ELDIN Mahmoud (106)
Shazia Sutlana (64)
Shevtsova Tetiana (44)
Shudiefat M. F. (88)
SIFAOUI Ines (89)
Sirdaarta J.P. (45)
Smadi Abla (90)
Souheila LAGGOUNE (47)
Sucontphunt Apirada (47)
Suleiman Olimat (83)
Sunbul J. Hamodi (146)
Susan Dura (124)
Syed Ali Raza Naqvi (48)
Štajner Dubravka (107)
T. Lograda (90)
Tahar Smaili (48)
Tail Ghania (120)
Tasheva, Krasimira (107)
Taxanna, A. (49)
Tigrine-Kordjani Nacéra (90)
Toth Dezider (72)
TRABSA H. (49)
Tseliuba Iulia (79)
Tsuchiya Hironori (50)
Valenzuela, A. (137)
Van Vuuren Sandy (65)
Vasas Gabor (91)
Viljoen, Alvaro (91)
Vinay kumar (50)
Vučurović M. Vesna (138)
Yassaa Noureddine (92)
Yotova Maya (93)
Zaher K. (93, 131)
Zaher K. Cherif S. (93)
Zamani Dehyaghobi Reza (120)
Zerroug Mohamed Mihoub (51)
ZERROUKI Khayra (51)
Zinchenko, Iryna (52)
ZRIRA Saadia (94)
Zuberi M. Hashim (53)
The 3rd International Symposium on Medicinal Plants, Their Cultivation and Aspects of Uses

Abstract Book
(ISBN 978-9957-31-012-7)

BeitZaman Hotel & Resort, Petra - Jordan
November 21-23/ 2012