ABSTRACT BOOK
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2018 International Conference on Agricultural and Food Science

ICAFS 2018

Conference Program & Abstract Book

http://icafs.apaset.org/2018/

Istanbul, Turkey

October 28th - 30th, 2018
Welcome Message from Local Organizing Committee

Dear distinguished participants from so many countries,

On behalf of the Local Organizing Committee, I would like to say welcome to Turkey for International Conference on Agricultural and Food Science. It is great pleasure for us and we are so happy to host you in a unique city, İstanbul, via this conference as organizing committee.

This annual conference integrates new findings in agricultural and food science. The conference is focused on: 1. Agronomy, Agriculture and Plant Biotechnology; 2. Animal Biotechnology, Veterinary and Livestock Science; 3. Aquiculture, Fishery and Marine Biotechnology; 4. Forestry Science and Wood Research; 5. Food Science; 6. Agriculture Sustainable, Resources & Environment; 7. Related Engineering, Economic & Management, etc. The purpose of this conference is to provide worldwide specialists, scholars, and researchers that are engaged in related filed a chance to exchange the latest research results and advances, study the latest technology and establish international friendship.

I hope, International Conference on Agricultural and Food Science will be an intensive conference and İstanbul will be a good experience for everybody from all sides. We sincerely hope that your stay in Turkey will be an unforgettable scientific and social event. Enjoy your time and the beauties of İstanbul.

With best regards.

Dr. Bülent Bülbül
Local Organizing Committee of ICAFS
Bahri Dağdaş International Agricultural Research Institute, Konya-Turkey
Welcome Message from Program Chair

Dear colleagues,

It is indeed a great pleasure to extend to you all a very warm welcome on behalf of the Organizing committee of to “International Conference on Agricultural and Food Science (ICAFS 2018), in Istanbul.

Various disciplines, including biology, nutrition, chemistry, biotechnology, microbiology, genomics, toxicology, sensory science, biomedical engineering, etc are contributing to agricultural and food sciences. Merging interdisciplinary is the stew in which creativity and innovation thrive. Such interactive creates insights by exposing researchers to ideas from other disciplines besides their own area of specialization. In this conference we intended to present and discuss various themes from the aspect of fundamental as well as application parts. Thence, numerous lectures and poster sessions are scheduled. In this context, I encourage all of you to keep supporting the conference and sharing your knowledge and professional expertise. I am confident that this platform will enable us to foster meaningful collaborations and establish networks that will enhance our research interests and goals. I encourage you all to participate actively in the interesting discussions over couple of days.

Before I turn over the conference to the chairman of the first session, I wish you all fruitful deliberations, I wish the conference all success, and I wish you all an enjoyable stay in Istanbul

Thank you

A. M. Abd El-Aty, PhD
Ataturk University, Erzurum,
Turkey, Cairo University,
Egypt
Table of Contents

About the Conference 7
Introduction 7
Venue 8
Conference Organizing 9-12
Abstract Book

Oral Presentation

Strategies for Boosting The Antimicrobial Activity Of Essential Oils and Other Natural Biopreservatives
Antonello Paparella, Chiara Rossi, Clemencia Chaves López, Francesca Maggio, Annalisa Serio

Eco-Friendly Management Of Collar Rot Of Peas (Phytophthora Megasperma) Through Use Of Bio Control Agents
Zafar Iqbal*, Muhammad Zohaib Anjum

“Quechers” Approach For Traditional / Conventional Detectors In Pesticide Residue Analysis
A. M. Abd El-Aty

The Investigation Of The Pharmacokinetics Of Two Enrofloxacin Preparations Following Parenteral Administration In Calves
Gül Banu Çiçek Bideci, Sezai Kaya

Agricultural Mechanization And Bmi For Rural Workers: A Field Experiment In China
Zizhen Guo, Yu Jiang, Sonya Huffman

Increasing fish Farmers Profitability Through Training On Best Aquaculture Management Practice In Egypt
Ahmed Nasr-Allah, Diaa Kenawy, Malcolm Dickson, Froukje Kruijssen, Harrison Karisa

Developing Of Trilobatin Dihydrochalcone As A New-Style Of Phytochemical Agent
Bhagwat Nawade, Mossab Yahyaa, Mwafaq Ibdah

Genetic Variation Of Barley Landraces
Wesam Al Khateeb

Biotechnological Approach And Its Application In The Pharmacological Field On Medicinal Plants Of Arid Zones
Chabane D.*, Mouhoub F., Rouane A., Bouguemra S. Harchaoui L., S. Lamara

Implementation Of Reproduction Technology On Mass Cultivation And Conservation Of Indonesian Native Fish (Rasbora Lateristriata) For National Food Program In Indonesia
Bambang Retnoaji

Quality Of Cranberries Subjected To Hybrid Microwave- Vacuum Assisted Drying
Zielinska M, Nowak K.W., Zielinska D.

Poster Presentation

Sensory Evaluation Of Gluten-Free Churros Made From Sorghum Flours And Bioactive Compounds Retention
Valéria Aparecida Vieira Queiroz*, Vinícius Tadeu da Veiga Correia, Caroline Liboreiro Paiva, Cícero Bezerra de Menezes, Rafael de Araújo Miguel, Robert Eugene Schaffert

Numerical Pixel Values Of Testes Parenchyma Measured By Ultrasonography In Different Ages
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Of South Karaman Rams</td>
<td>29</td>
</tr>
<tr>
<td>Bülent Bülbül, Necdet Akay</td>
<td></td>
</tr>
<tr>
<td>Effect Of Drying Temperature On The Biological Activity Of Three Algerian Fig Varieties (Ficus Carica L.)</td>
<td>30</td>
</tr>
<tr>
<td>Farid Boukhalfa, Nabil Kadri*, Hayat Ouatah, Mohamed Chibane, Khodir Madani</td>
<td></td>
</tr>
<tr>
<td>Contamination Of Irrigation And Drinking Water By Non-Steroidal Anti-Inflammatory Drugs</td>
<td>31</td>
</tr>
<tr>
<td>Djamila Djebbar, Amine Elmouseatezz Bellah Kermia, Rêda Djebbar</td>
<td></td>
</tr>
<tr>
<td>Development Of Novel Food Packaging Films With A Long-Term Antimicrobial Activity</td>
<td>32</td>
</tr>
<tr>
<td>Manel Seray, Assia Siham Hadj-Hamou</td>
<td></td>
</tr>
<tr>
<td>Water Pollution Caused By Surfactants: Extraction Without Organic Solvent Of The Anionic Surfactants</td>
<td>33</td>
</tr>
<tr>
<td>M. Idouhar</td>
<td></td>
</tr>
<tr>
<td>Concentrations Polychlorinated Biphenyls (PcbS) In Agricultural Soil, (Northwest Algeria)</td>
<td>34</td>
</tr>
<tr>
<td>Touabet Abdelkrim, Ahmed Halfadji</td>
<td></td>
</tr>
<tr>
<td>A Bacterial Polysaccharide For Water Saving In The Rhizosphere Of Arid Soils</td>
<td>35</td>
</tr>
<tr>
<td>Boukhelata Nadia, Kaci Yahia</td>
<td></td>
</tr>
<tr>
<td>Evaluation Of Anti-Inflammatory Activity Of Aqueous Infusion Extract Of Deverra Scoparia Coss. &amp; Dur. (Tamanrasset, Algeria)</td>
<td>36</td>
</tr>
<tr>
<td>Saida Ouafi,*, Lilya Harchaoui, Djamila Chabane</td>
<td></td>
</tr>
<tr>
<td>Automatic Irrigation System For Tomato Seedling Production</td>
<td>37</td>
</tr>
<tr>
<td>Alemán, C.C., Campos, F.B., Mantovani, E.C.</td>
<td></td>
</tr>
<tr>
<td>Impact Of Exogenous Proline On The Physiological Behavior Of Fenugreek (Trigonella Foenum-Graecum) Seedlings Subjected To Herbicide Stress</td>
<td>38</td>
</tr>
<tr>
<td>Karima Boulahia, Chaïma Ould-Said, Ouzna Abrous-Belbachir</td>
<td></td>
</tr>
<tr>
<td>Bioflavonoids And Fatty Acids Profiling Of Date Palm Seeds (Phoenix Dactylifera L.) From Algerian Sahara</td>
<td>39</td>
</tr>
<tr>
<td>Rabia Gaceb-Terrak, Najla Bentrad, Fatma Rahmania</td>
<td></td>
</tr>
<tr>
<td>Structural And Physiological Aspect Of The Polysaccharide Produced By P Fluorescens Strain T17 Isolated From An Arid Region Of Algeria</td>
<td>40</td>
</tr>
<tr>
<td>Farida Taguett, Yahia Kaci</td>
<td></td>
</tr>
<tr>
<td>Effects Of Phosphorus On Biomass And Symbiotic Frequency Of Chickpea Growing Under Salt Stress</td>
<td>41</td>
</tr>
<tr>
<td>Sadji-Ait Kaci H, Chaker-Haddadj A, Aid F.</td>
<td></td>
</tr>
<tr>
<td>Antibacterial Activity And Chemical Composition Of Volatiles Of Anethum Graveolens L. Growing Wild In Algeria</td>
<td>42</td>
</tr>
<tr>
<td>Mecherara-Idjeri Samira, Touti salima, Dilmal nawel, Boubekeur siham</td>
<td></td>
</tr>
<tr>
<td>Chemical Variability Of Aerial Part And Isolated Leaves Essential Oils From Haplophyllum Tuberculatum (Forssk) A. Juss During The Flowering Stage And Their Impact Against Antioxidant Activity</td>
<td>43</td>
</tr>
<tr>
<td>Aberrane Sihem, Boudarene Lynda, Djouahri Abderrahmane, Saka Boualem, Benseradj Fadhela, Aitmousea Samira</td>
<td></td>
</tr>
<tr>
<td>Evaluation Of Biogas Recovery Using Anaerobic Digestion Of Biodegradable Food Wastes</td>
<td>44</td>
</tr>
<tr>
<td>Lamia Kadir, Aissa Khelifi, Noureddine Yassaa</td>
<td></td>
</tr>
<tr>
<td>Chemical Composition Of Essential Oils Of Eucalyptus Bosistoana Leaves, And Twigs Obtained By Hydredistillation And Microwave-Assisted Hydredistillation</td>
<td>45</td>
</tr>
<tr>
<td>Y Foudil-Cherif, A. Zaffani</td>
<td></td>
</tr>
<tr>
<td>Analysis By Capillary Gas Chromatography Of Natural Substances Using A New Liquid Crystal As Stationary Phase</td>
<td></td>
</tr>
</tbody>
</table>
About ICAFS2018

Introduction

The 2018 International Conference on Agricultural and Food Science (ICAFS2018), co-organized by Asia-Pacific Association of Science, Engineering and Technology, Bahri Dağdaş International Agricultural Research Institute, Celal Bayar University and Iğdır University, will be held in Istanbul, Turkey during October 28-30, 2018.

Organized by:

In collaboration with:

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Venue

Nippon Hotel is nearly the first Hotel in Talimhane since 1989. After 16 years experience we knew that we should do something exclusive. We closed the Hotel in November 2005 and had a long renovation. Nippon Hotel opened its doors on 14th June 2006 with new structuring and new professional team.

Our mission is to increase your aim with our Turkish tradition of hospitality and keep our standards very high which so that everybody leaves us happy. Inspired by Japanese minimalist design, Nippon Hotel is a 5-minute walk from the famous Taksim Square. It has a state-of-the-art fitness centre, and offers spacious guest rooms with free WiFi.

Nippon rooms have air conditioning and modern furnishings. They come equipped with a flat-screen TV and a minibar with complimentary water. Tea&coffee setup is offered free of charge. Some rooms feature a kitchenette and have a spa bath in the bathroom. The hotel has a trendy restaurant that offers buffet breakfast and serves Turkish and international cuisines made from locally sourced ingredients.

Hotel Nippon guests can enjoy a massage, or rent a bicycle and explore Istanbul. The hotel also has a tour desk that provides a ticket service and offers information on local attractions. Nippon Hotel is a 5-minute walk from the bustling streets and nightlife of Nisantasi. Ataturk Airport is 20 km away. The hotel offers free private on-site parking and has an airport transfer service available upon request. Lutfi Kirdar Convention Centre, Istanbul Congress Centre, Cemal Resit Rey Concert Hall and Muhsin Ertugrul Theatre are within 1.3 km distance.

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Keynote Speakers

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Prof. Antonello Paparella
Full Professor of Food Microbiology at the Faculty of Agricultural Science, University of Teramo, Italy
STRATEGIES FOR BOOSTING THE ANTIMICROBIAL ACTIVITY OF ESSENTIAL OILS AND OTHER NATURAL BIOPRESERVATIVES

Antonello Paparella, Chiara Rossi, Clemencia Chaves López, Francesca Maggio, Annalisa Serio

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The need to control microbial growth in foods is pushing research into biopreservatives available in nature. In particular, essential oils (EOs), obtained by plant hydrodistillation, are hydrophobic, mainly composed of phenolic compounds, and exert antioxidant and antimicrobial activity against bacteria, yeasts and moulds. Hydrosols, or aromatic waters, are by-products of plant distillation, and consist of distillation water including small amounts of dispersed EOs. They are hydrophilic, with a composition similar to the corresponding EO, although in lower quantities, still showing antimicrobial activity. EOs modify bacterial growth dynamics, gradually extending lag phase and reducing growth potential, up to impairing cell development and determining its death. EOs also impact on microbial physiology: sub-lethal concentrations of Austroepatorium inulifolium EO stimulated the production of fungal pectinase, cellulase, protease and amylase, with interesting biotechnological implications. Oreganum vulgare EO reduced the Pseudomonas fluorescens capability to form biofilm, also contributing to cells detachment in preformed biofilm and altering cell motility, suggesting potential applications in food industries as alternative to conventional sanitizers. Natural biopreservatives are useful allies also in the medical field: for example, Lavandula hybrids (lavandins) EOs inhibited the growth of both food and clinical isolates of Listeria monocytogenes. Moreover, Borojoa patinoi Cuatrecasas water extract inhibited multidrug resistant pathogenic strains, also revealing anti-proliferative activity against Caco-2 cell line. The application of biopreservatives in foods often presents some difficulties, such as impact on sensory characteristics, or the need of a vehicle, which can reduce the amount of biopreservatives used. Surface treatments could by-pass the problem, (e.g. olive mill wastewater extracts to control moulds growth on sausage casings. Strategies for boosting biopreservatives activity, thus reducing the amounts needed, can combine different principles or exploit the hurdles technology. For example, the antilisterial activity of hydroalcohol extract of Myrtus communis L. berries could be enhanced by salt and acid pH. Chitosan films incorporated with 1% Thymus capitatus EO were active against seafood spoilage bacteria. Chitosan films enriched with EOs also exerted antifungal activity in vegetables, thus reducing post-harvest fruit decay. In conclusion, natural biopreservatives have a great potential in different fields, particularly in the food industry, but more studies are necessary to boost their activity.

Keywords: Essential Oils; Antimicrobial Activity; Natural Biopreservatives
ECO-FRIENDLY MANAGEMENT OF COLLAR ROT OF PEAS 
*(PHYTOPHTHORA MEGASPERMA)* THROUGH USE OF BIO CONTROL AGENTS

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Pea (*Pisum sativum* L.) is common pulse crop of the world. Its yield is reduced due to many diseases but collar rot caused by *Phytophthora megasperma* is the major constraint limiting its production. Use of bio control agents is considered eco-friendly and efficient way to manage the plant diseases. In present study, three characterized Trichoderma isolates viz. *Trichoderma harzianum* HK, *T. viride* ZA and *T. asperellum* TH and one isolate of *Bacillus subtilis* were assessed by using different antagonistic assays viz. dual culture, volatile metabolites and nonvolatile metabolites against the pathogen *P. megasperma*. Results revealed that all the treatments reduced the radial growth of the tested pathogen. In dual culture, *T. asperellum* showed the highest percent inhibition about 67.43% of pathogen followed by *T. harzianum* HK (62.85%), *B. subtilis* (51.07%) and *T. viride* ZA (46.13%). On the basis of results, it is inferred that biocontrol agents have great potential to antagonize the plant pathogens with no or less health hazards. These studies will be much helpful to devise environmental friendly approaches for disease management in future.

**Keywords:** Peas; Root rot; Antagonist; *Trichoderma; Bacillus*
“QUECHERS” APPROACH FOR TRADITIONAL/ CONVENTIONAL DETECTORS IN PESTICIDE RESIDUE ANALYSIS

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In residue analysis, relatively low-sensitivity traditional detectors, such as UV, diode array, electron-capture, flame photometric, and nitrogen-phosphorus detectors, have been used following classical sample preparation (liquid-liquid extraction and open glass column cleanup); however, the extraction method is laborious, time-consuming, and requires large volumes of toxic organic solvents. A quick, easy, cheap, effective, rugged, and safe method was introduced in 2003 and coupled with selective and sensitive mass detectors to overcome the aforementioned drawbacks. Compared to traditional detectors, mass spectrometers are still far more expensive and not available in most modestly equipped laboratories, owing to maintenance and cost-related issues. Even available, traditional detectors are still being used for analysis of residues in agricultural commodities. It is widely known that the quick, easy, cheap, effective, rugged, and safe method is incompatible with conventional detectors owing to matrix complexity and low sensitivity. Therefore, modifications using column/cartridge-based solid-phase extraction instead of dispersive solid-phase extraction for cleanup have been applied in most cases to compensate and enable the adaptation of the extraction method to conventional detectors. In gas chromatography, the matrix enhancement effect of some analytes has been observed, which lowers the limit of detection and, therefore, enables gas chromatography to be compatible with the quick, easy, cheap, effective, rugged, and safe extraction method. For liquid chromatography with a UV detector, a combination of column/cartridge-based solid-phase extraction and dispersive solid-phase extraction was found to reduce the matrix interference and increase the sensitivity. A suitable double-layer column/cartridge-based solid-phase extraction might be the perfect solution, instead of a time-consuming combination of column/cartridge-based solid-phase extraction and dispersive solid-phase extraction. Therefore, replacing dispersive solid-phase extraction with column/cartridge-based solid-phase extraction in the cleanup step can make the quick, easy, cheap, effective, rugged, and safe extraction method compatible with traditional detectors for more sensitive, effective, and green analysis.

**Keywords:** Pesticide Residue; Analysis; Detector; QuEChERS
THE INVESTIGATION OF THE PHARMACOKINETICS OF TWO ENROFLOXACIN PREPARATIONS FOLLOWING PARENTERAL ADMINISTRATION IN CALVES

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Enrofloxacin is a bactericidal antimicrobial drug in the fluoroquinolone group, developed for use only in the veterinary field. It is effective against gram negative and gram positive bacteria, Mikoplasma, Rickettsia, Ehrlichia ve Chlamydia. Enrofloxacin is converted to several effective and ineffective metabolites including ciprofloxacin. Ten to fifty percent of the drug is eliminated via urine and bile in unmetabolized form. Enrofloxacin is used in all domestic animal including ruminant and winged animals. In calves, enrofloxacin finds utilization in the respiratory system infections, septicemia caused by colibacillosis and in cases of intestinal inflammation by oral and parenteral ways. There are around 1920 enrofloxacin preparations with different formulations in Turkey. Eight hundred fifty-five of these preparations are in the form of parenteral solutions that are ready for use. In this study, the pharmacokinetics of two enrofloxacin preparations that are used in calves were investigated. Ten female calves (Jersey strain, 46-50 day-old) were included. The animals were taken to a separate environment 15 days in advance, and medication administration was restrained. Throughout the trial, the animals were fed with unmedicated feed. Calf growing feed, water, and hay were given freely as feed. They continued to be fed by 3 liters of milk twice a day. The study was reviewed by Ankara University Animal Trials Local Ethics Committee and approved with decision number 2007-7-17 and file number 2007-56. The calves were divided into two groups including five calves each. Reference drug and test drug were administered intramuscularly at a dose of 2.5 mg per kg to group 1 and group 2, respectively. Blood samples were taken before (0.0 min) and after the drug administration at 0.25, 0.5, 1, 2, 4, 8, 12, 18, 24 and 36th hours. The method was used for plasma enrofloxacin extraction and concentration. The chemicals, drugs, and solutions that were used in the study are acetonitrile, triethylamine, methanol, enrofloxacin (provided by Bayer Turk), reference drug (50 mg/ml injectable enrofloxacin, 20 ml per vial), test drug (100 mg/ml injectable enrofloxacin, 20 ml per vial). The pharmacokinetic variables were investigated after parenteral administration of reference and test drugs. The plasma concentration-time curve for each animal showed that enrofloxacin followed the two-compartment open model. There were statically significant differences in area under curve, absorption rate constant and absorption half-life between reference and test drugs (p < 0.05). However, these differences were evaluated as insignificant from the point of clinical pharmacology. Peak plasma concentration was reached 0.8-1.2 hours after the administration of both reference and test drugs. It was also seen that the drug concentration stayed above 0.5 µg/ml for approximately 4 hours and decreases to 0.04 µg/ml at the 36th hour after administration. The results obtained for both reference and test drugs in this study show that enrofloxacin is well absorbed from the gastrointestinal track. The drug concentration in plasma continues to be higher than 0.5 mg/ml during the first 24 hours. The authors of this study think that the differences that were found in this study regarding pharmacokinetic variables are not significant regarding clinical pharmacology although some
statistically significant differences were found. The results of this study imply that both reference and test drugs may be used interchangeably.

**Keywords:** calf; enrofloxacin; pharmacokinetic.
AGRICULTURAL MECHANIZATION AND BMI FOR RURAL WORKERS: A FIELD EXPERIMENT IN CHINA

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The increase in the world’s food production is attributable to modern agricultural evolution, including motorization, mechanization, biological selection, and the use of chemicals. The average daily intake of calories has increased over the years, which has led to overweight, obesity, and related chronic diseases worldwide (WHO, 2017). This is leading to serious public health concerns in developed and developing countries. Over the past three decades, China has recorded impressive economic development. The modernization and rising incomes were propelling rapid lifestyle changes, including a shift from traditionally healthy diets to westernized diets, in China. These changes are often associated with an increase in weight and chronic deceases. Agricultural mechanization helped enhance agricultural productivity and lowered the unit costs of agricultural production. Major technological advances in farming also have emerged, such as increasingly mechanized farm work, which is associated with a decrease in energy expenditures. In recent years, agricultural mechanization is utilized in Chinese rural households. The main questions to be addressed in this study are, “Does agricultural mechanization affects the Body Mass Index (BMI) of the rural resident in China, and “If so, how?” This paper examines whether and how agricultural mechanization affects the BMI of farmers in rural China using a unique data set. We conducted a field experiment with face-to-face interviews in 135 counties of 12 provinces in China in 2013. It includes 4,229 individuals from 1,024 rural households, of which 1,033 of the 2,165 workers are farmers. The field experiment is conducted in east (Jiangsu, Zhejiang, and Shandong provinces), central (Hubei, Henan, and Anhui provinces) and west (Gansu, Shanxi, Ningxia, Sichuan, Yunnan, and Shanxi provinces) China in 2013. We use standardized structured questionnaire and stratified random sampling method to collect the data from face-to-face interviews with rural households. The data shows that the BMI of farmers who utilize agricultural mechanization is about 10 percent larger than those who do not at a 1 percent significance level. Our preliminary results suggest that the adoption of agricultural mechanization has a positive and statistically significant effect on farmers’ BMI in China: it increases the BMI of farmers by 7.8 percent. Agricultural mechanization significantly reduces hours of farm work. The reduced hours of farm work due to the adoption of agricultural mechanization explain 30 percent of the BMI increase of rural farmers. The modernization and rising incomes in China are propelling rapid lifestyle changes, including a shift from traditionally healthy diets to westernized diets. As in other countries in the world, a Chinese epidemic of overweight and obesity poses a considerable public health problem that needs to be addressed by the policy makers. Understanding BMI in rural China is important in order to define what public policies are most likely to be effective in preventing and reducing obesity in rural China.

Keywords: Rural Workers, BMI, Agricultural Mechanization, China
INCREASING FISH FARMERS PROFITABILITY THROUGH TRAINING ON BEST AQUACULTURE MANAGEMENT PRACTICE IN EGYPT

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However, the Egyptian aquaculture production reached more than one million tons per year, Egyptian fish farmers have received little extension or training. Best management practice (BMP) training for pond-based tilapia monoculture and tilapia-mullet polyculture fish farmers started in 2012. Field-based training modules were developed and designed with the participation of leading farmers and delivered through private sector farmer-trainers to over 2400 fish farm owners and managers. This paper study the results of an impact assessment survey comparing fish farm performance, production and profitability in randomly selected farms where the manager had received the BMP training (BMP) and those who had not received training (control). The results show that average yields and revenue were similar between the two groups, although BMP farms produced less small-sized tilapia and more mullet than the control farms. The BMP training lead to improved feed and fertilizer management. The more efficient of food conversion ratios resulted in a significantly lower operating costs in BMP farms compared to control farms. Fixed costs were similar for the two groups. Average net profits were significantly higher in BMP farms compared to control farms. The results demonstrate that fish farms can benefit significantly from the adoption of improved farm management practices suggesting that similar approaches, including field-based BMP training and the use of private sector farmer-trainers should be used to accelerate the development of aquaculture sectors in other parts of Africa. The current research demonstrates clear improvements in the profitability of Egyptian fish farmers following best management practice training.

Keywords: Aquaculture; Best practices; economic; profit; Egypt.
DEVELOPING OF TRILOBATIN DIHYDROCHALCONE AS A NEW-STYLE OF PHYTOCHEMICAL AGENT

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The increasing prevalence of several diseases, like Alzheimer’s disease, obesity, cancer, and diabetes, in humans in recent decades worldwide, accompanied by rising concern regarding the safety of many synthetic chemistry-based pharmaceuticals, has raised public demand for phytochemical-based medicines. This in turn has led to increasing interest in metabolic engineering as an approach to produce such natural products on an industrial scale, which has the potential to decrease production costs of, e.g. desired dihydrochalones. We note that fruits accumulating high level of phytochemicals including flavonoids and dihydrochalones that may play a key role in reducing chronic disease risk. We have developed a novel concept to produce a new-style phytochemical agent of benefit for humans by genetic transformation of three characterized genes in plant cells, bacterial, and yeast systems. We have applied a set of molecular and biochemical tools to identified reactions and enzymes leading to the biosynthesis of dihydrochalones. We recently cloned and biochemically characterized three key enzymes in the dihydrochalcone biosynthesis pathway; a p-coumaroyl-CoA double bond reductase that converts p-coumaroyl-CoA into p-dihydrocoumaroyl-CoA, chalcone synthase that accepted p-dihydrocoumaroyl-CoA, in the presence of malonyl-CoA, leading to production of phloretin, and a specialized phloretin-4’-O-glycosyltransferse which glycosylated phloretin in the presence of UDP-glucose into trilobatin. Based on these characterized enzymes, we propose a novel approach to metabolically engineer flavonoid producing plant cells, and bacterial system to accumulate the phytochemical trilobatin. A proof of concept will open the possibility for developing new-style of natural phytochemical for a growing market of population suffering from "modern" diseases.

Keywords: Trilobatin Dihydrochalcone; Phytochemical Agent; characterized enzymes
GENETIC VARIATION OF BARLEY LANDRACES

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The aim of this study was to assess the agromorphological and genetic diversity of barley landraces in Jordan. 22 barley landraces were collected from different regions and 14 agromorphological traits were studied. ANOVA showed highly significant variations (P ≤ 0.01) among landraces for all studied traits. Cluster analysis of quantitative variables revealed three major groups within the collection confirming the genetic diversity among the landraces and also reveal similarities between 7 landraces. Our results indicated that no consistence association between the geographical origin of the landraces and cluster analysis. A positive correlation was observed between plant height, number of leaves, number of seeds per spike and internode length. In conclusion, results indicate that the studied barley landraces must be conserved as valuable genetic resources and used in farther breeding programs worldwide.

Keywords: Genetic Variation; genetic diversity; Barley Landraces; Jordan
BIOTECHNOLOGICAL APPROACH AND ITS APPLICATION IN THE PHARMACOLOGICAL FIELD ON MEDICINAL PLANTS OF ARID ZONES

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Plants therapeutic interests are increasingly used in traditional medicine especially in the arid regions of southern Algeria. The identification of plant species through the greater use of indigenous survey showed disappearance of many species used in pharmacopoeia and traditional local knowledge, hence the importance of the national heritage through the application of methods plant biotechnology based on the technique of in vitro culture after a series of macroscopic observations through the ethnobotanic survey, plant morphology and anatomic study. The ethnobotanical study is the basic tool used for the development of knowledge with respect to ethnic traditional medicine for the creation of a bank of information on traditional medicine, based on the recognition of plants in the field, description of therapeutic plants, and systematic, collection of different methods of preparation, determination of parts used. The questioning on medicinal plants established with the local population can identify therapeutic traditional recipes based on several plants and select the most interesting. In vitro culture of small parts of many endemic plants on synthetic media containing growth regulators induced calli formation. These calluses are intense cell multiplication used in production of high quantity of secondary metabolites in comparison to the mother plant. This track operated in plant biotechnology in many plants in the world could open up broad prospects for use in the pharmaceutical field and for the enhancement of plant species used medicinally.

Keywords: Arid Zones; Medicinal Plants; application; ethnobotanical study
IMPLEMENTATION OF REPRODUCTION TECHNOLOGY ON MASS CULTIVATION AND CONSERVATION OF INDONESIAN NATIVE FISH (RASBORA LATERISTRIATA) FOR NATIONAL FOOD PROGRAM IN INDONESIA

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Indonesia has very high freshwater fish diversity. Wader pari (Rasbora lateristriata) is one among very popular native fish, which is currently undergoing massive exploitation. There are three major issues related to these fish: 1). Its economic value and high demand of its availability in the market induced a massive exploitation of the fish in the wild, 2). Community lacks awareness for fish conservation and cultivation due to its availability in nature, and 3). Until recently, there was no specific designed conservation program for the fish. Lack of reproduction technology is one of the reasons, that until recently, there is no mass cultivation and conservation program for wader fish. Laboratory of Animal Development and Structure, Faculty of Biology UGM, has succeeded in developing fish reproduction technology, including spawning, breeding and cultivation techniques of wader fish. Therefore, dissemination for the reproduction technology to fish farmer group is urgently needed. The program aimed to disseminate fish reproduction technology to fish farmer group at Yogyakarta. We have initiated the program by partnering with Handayani, Mandiri Sejahtera, and KPI Santan Mina Lestari fish farmers group of Yogyakarta, Indonesia. The implementation consisted of four activities as follows: 1). Recruitment of fish farmer group for fish mass cultivation; 2). Mass cultivation training for fish reproduction technology; 3). Fish mass cultivation implementation in the field; and 4). Evaluation of the cultivation program. We conducted mass cultivation trial method on two group of fish farmer which carried out: 1). Full outdoor fertilization-cultivation and 2). Combination of indoor fertilization and outdoor cultivation. There were three replication for both setups. The result showed that, full outdoor succeeded to conduct two times fertilization, but experiencing one failure of egg production, whereas, group for combination of indoor-outdoor fertilization-cultivation, showing 100% success rate of egg and larvae production. To understand the influence of indoor and outdoor environment to the reproduction of the fish, we further studied the factor that possibly affecting the cultivation, by comparing indoor outdoor factors. The results showed that environmental parameters such as temperature, pH, dissolved oxygen and light intensity in indoor conditions were more stable compared to the fluctuating outdoor. Moreover, the study also showed that outdoor fluctuating condition affected the fish fecundity, gonad maturity index, egg number, and egg diameter. The environment fluctuation of outdoors also increase concentration of stress protein HIF-1α expression and estradiol hormone level on female wader pari fish. Overall, there is a high confidence that the implementation of the program could be used as model for natural resources management based of sustainable development, and the provision of fish seed bank for the preservation of Indonesia's native biological natural resources.

Keywords: Indonesia; native fish; Rasbora lateristriata; reproduction; indoor; outdoor
QUALITY OF CRANBERRIES SUBJECTED TO HYBRID MICROWAVE-VACUUM ASSISTED DRYING

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Cranberries are rich in polyphenols such as anthocyanins, proanthocyanidins, flavonoids, phenolic acids, and tannins, which contribute to antioxidative, anticancer, antimutagenic, antimicrobial, anti-inflammatory and neuroprotective activities. Due to the seasonality of production and the high-water content, cranberries are subjected to preservation using different methods of pretreatment and drying. The native wax surface layer being a barrier for heat and mass transfer processes makes conventional drying and preservation of cranberries difficult and time consuming. Therefore, there is a need to continuously improve and develop effective methods of moisture removal. Limited or scant literature data can be found on the effect of different methods of pretreatments and drying on the material properties. The aim of study was to investigate the effect of different initial treatments and hybrid drying on the drying kinetic and quality attributes of cranberries. Hybrid drying included osmotic dehydration, convective drying and microwave-vacuum drying. Six methods of pre-treatment, namely: sonication, convectional freezing, convectional freezing preceded by sonication, convectional freezing preceded by microwave-vacuum pre-treatment, cryogenic freezing, microwave-vacuum pre-treatment were used before hybrid drying. Quality properties included texture, colour and bioactive compounds.

Keywords: Cranberries; quality; Hybrid Microwave-Vacuum Assisted Drying
SENSORY EVALUATION OF GLUTEN-FREE CHURROS MADE FROM SORGHUM FLOURS AND BIOACTIVE COMPOUNDS RETENTION

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Churro is a very popular food in Latin American countries, prepared with wheat flour and water, in cylindrical format, fried in vegetable oil and sprinkled or not with a layer of sugar and cinnamon. Sorghum has played an important role in the new food products development, especially to the celiac individuals, because it is gluten free and has functional properties. Despite the high bioactive compound’s concentrations in sorghum genotypes, there is little information regarding their stability after thermal processing. Thus, this study aimed to develop and evaluate the acceptability of two types of churros made with sorghum flours of the genotypes BR 501 (white pericarp, without tannin) and BRS 305 (brown pericarp, with tannin), as well to evaluate the tannins, total anthocyanins, total phenols and antioxidant activity retentions after the thermal processing (cooking and frying). Churros were made based on a standard formulation, with substitution of wheat for sorghum flours and added to water, sugar, butter, salt and egg. Flavor, color, aroma, texture and overall impression attributes were evaluated by 110 untrained tasters using a 10-cm hybrid hedonic scale varying from 0 (I greatly disliked) to 10 (I liked very much). Both products were well accepted in all attributes, with acceptability index ranging from 77.8 to 88.4%. The churro made with BRS 305 obtained a higher score in texture and overall impression, so, the tannin did not negatively influence its acceptance. The antioxidant activity, tannins, anthocyanins and phenols contents were lower in the cooked and fried dough than in the raw dough, evidencing effect of the heat on these bioactive compounds. The processed product showed 37% of tannins and about 55% of anthocyanins, phenols and activity antioxidant retentions. Sorghum has potential to be introduced, especially into the gluten-free food market, and can bring health benefits to the consumers.

Keywords: Sorghum bicolor L.; tannin sorghum; antioxidant capacity; total phenols

Acknowledgement: Fapemig; CNPq; Embrapa
To evaluate the numerical pixel values (NPV) measured by ultrasonography of testicular parenchyma in different ages of South Karaman sheep breed, 41 rams were allocated to 4 groups according to their ages at examination in the breeding season (August). Rams were 0.50±0.014, 1.50±0.027, 3.10±0.137 and 4.63±0.109 years old in groups 1, 2, 3 and 4, respectively (mean±SEM). Testicular ultrasonography was carried out using a B-mode ultrasound scanner with a 7.5 MHz linear transducer (Mindray DP-50 VET, Shenzhen Mindray Bio-Medical Electronics Co, Ltd, Shenzhen, China) once at the same day in all groups. All evaluations were performed by a single professional and all settings on the ultrasound unit such as the range, contrast, overall gain, near and far gain, and focal points were kept constant during the examinations. Rams were physically restrained by two assistants while the testes were immobilized without pressure. An aqueous gel was used as a coupling material between the transducer and the testes. Scans were performed in the longitudinal and transversal planes to evaluate the testicular parenchyma. Images containing the largest cross-sectional area in view of each testicle were frozen as still images, and then recorded on the hard disk of ultrasound device. Computerized image analysis of the testicular parenchyma was conducted using an image analytical software (ImageJ 1.48v, Wayne Rasband National Institutes of Health, USA). Using the spot meter technique, ten spots of ~1 cm$^2$ each for each testis (six for longitudinal and four for transversal planes; 3 spots below and 3 spots above, and 2 spots below and 2 spots above the mediastinum tests respectively for longitudinal and transversal planes) were placed while avoiding reflection artefacts and overlapping the spots. The mean NPV from each region of interest were recorded. The grey values obtained were averaged to give the overall mean of the respective testis. Least squares analysis of variance was done using General Linear Model procedure to compare the differences between the means of NPV of groups. Differences between means were compared using TUKEY test. Two sample t test was performed to compare the means of NPV of longitudinal and transversal planes, right and left testes, and below and above sections of testes. There was a significant difference between the groups in NPV and it increased with the age after the age 1.5 (60.01±4.143, 60.50±4.858, 69.37±3.811 and 83.05±4.580 in groups 1, 2, 3 and 4, respectively, mean±SEM) (p=0.003). There was no significant difference between NPV of right and left testes, and between longitudinal and transversal planes. All numerical pixel values taken from above section of longitudinal and transversal planes of right and left testes according to the mediastinum were lower than below sections (p<0.000). In conclusion, the echogenicity of testicular parenchyma increased with the age of South Karaman rams. And it is also concluded that, when evaluating the echogenicity of testicular parenchyma, taking the spots equally from both above and below sections of the testes according to the mediastinum is essential.

Keywords: testes parenchyma; ultrasonography; Numerical pixel value; Karaman rams

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EFFECT OF DRYING TEMPERATURE ON THE BIOLOGICAL ACTIVITY OF THREE ALGERIAN FIG VARIETIES (FICUS CARICA L.)

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The fig (Ficus carica L.), is a highly perishable fruit, even in refrigerated conditions, this is why almost all the production of the world is stored in the dry form. Drying with the sun is the conventional method employed to obtain dry figs in Algeria, this method exposes the products to dust, the flies and the stains and contaminations, no control allows on the parameters of drying and lengthens the period of drying although it produces figs with very good sensory properties. Nevertheless, dehydration by the driers industrialist has much more advantages compared to drying with the sun, the process is under better sanitary arrangements; parameters of drying can be placed exactly, controlled and changed during the duration of the whole transformation. The goal of this work is to study the effect of the temperature of drying on the biological activity of three varieties of algerian fig, by the dosage of certain antioxydants, and also by the determination of their activities reducing and antiradicalaire in order to optimize a temperature of drying. These three varieties of figs treated beforehand by bleaching undergo adehydration with the sun, 35°C, 45°C and 55°C. The drying of figs makes it possible to increase the content polyphenols, flavonoids, carotenoids and the reduction, but it causes the reduction in the vitamin C and the anthocyanines by their destruction. Statistical study ANOVA MANOVA revealed that the batch dried with 55°C and 45°C present the highest biologic activity, followed by the batches dried to the sun and 35°C. The fresh batch presents the weakest biologic activity.

Keywords: figs; traditional drying; drying industrial; antioxidant; biological activities.
CONTAMINATION OF IRRIGATION AND DRINKING WATER BY NON-STEROIDAL ANTI-INFLAMMATORY DRUGS

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Water used for irrigation, even if it is treated, may contain micropollutants such as drugs. Thus, the presence of pharmaceuticals in aquatic ecosystems has been the subject of several research studies in recent decades. Known as "Emerging Contaminants", these substances can enter hydrographic systems through various ways, such as active compounds, metabolites or a combination of both. The continued release of these compounds into aquatic environments due to their very large consumption is a serious problem, engendering the so called "pseudo persistence". In this context, the work presented focuses on the occurrence and the fate Naproxen and Paracetamol non-steroidal anti-inflammatory drugs, in different aquatic compartments of Algiers area that have a direct impact on the environment.

Keywords: Micropollution; Drug; Environment; Naproxen; Paracetamol; Water.
DEVELOPMENT OF NOVEL FOOD PACKAGING FILMS WITH A LONG-TERM ANTIMICROBIAL ACTIVITY

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In recent years, inorganic antimicrobial agents, such as metal oxides, have received increasing attention in food applications because they are not only stable under high temperatures and pressures that may occur in harsh food-processing conditions, but they are also generally regarded as safe for human beings and animals relative to organic substances. ZnO nanoparticles have been shown to have a wide range of antibacterial activities against both Gram-positive and Gram-negative bacteria, including major foodborne pathogens like Escherichia coli, Salmonella and Staphylococcus aureus. The purpose of this research was to develop antimicrobial nanocomposite films made from biodegradable poly (butylene terephthalate-co- acid adipate) incorporated with ZnO nanoparticles (2, 3 and 5 wt.%), finding their application in the field of active packaging. Morphological, thermal, and gas barrier properties of PBAT/ZnO films were examined using various analytical methods. The release of the Zn\(^{2+}\) ions from the hybrids films was investigated \textit{in vitro}, for a time period of 30 days. The release profiles of Zn\(^{2+}\) ions showed a two-phase exponential profile with fast initial phase followed by a slower rate of release. Due to controlled release these packaging films displayed a long-lasting antibacterial activity against gram negative bacteria (\textit{E. coli} and \textit{P. aeruginosa}) as well as gram positive bacteria (\textit{S. aureus} and \textit{B. subtilis}).

\textbf{Keywords:} Active films; antimicrobial properties; poly (butylene terephthalate-co- acid adipate); food packaging
Anionic surfactants (A.S) are currently the most type used, being incorporated in the majority of detergent and cleaning-product formulas in daily use. They are discharged into environmental areas such as surface water, and produce foams and emulsion, they cause degradation of the quality of water and aquatic life. Increasing interest have been made on the environmental protection, from the effects of A.S on the environment. Therefore, the detection of traces of A.S in environmental samples is of great interest and is taking great importance in environmental protection and in many other related fields. In this present work, we report a useful method for determination of anionic surfactants based on the new extraction without organic solvent using Brillant Green as a dye. The obtained results show that the method can be applied for the determination of traces of anionic surfactants in most areas like in sea and river waters and in wastewaters also. Some applications give us most satisfaction in using this technique.

**Keywords:** Water pollution; surfactants; organic solvent; anionic
CONCENTRATIONS POLYCHLORINATED BIPHENYLS (PCBS) IN AGRICULTURAL SOIL, (NORTHWEST ALGERIA)

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The aim of this study is to determine concentrations of polychlorinated biphenyls (PCBs) in surface soils devoted to different land uses in northwest Algeria. Microwave-assisted extraction (MAE) and gas chromatography/mass spectrometry (GC–MS) methods were applied to quantify 7 PCB congeners in surface soils. The sum of the 7 European indicator PCBs ranged from n.d. to 19.34 ng g⁻¹. While commercial mixtures of PCBs (Aroclor 1254 and 1260) were sources of PCBs in urban/residential and industrial sites. This is a first screening of data about PCBs in soils around a Mediterranean city (Oran, North Africa), and a first step toward a better understanding of the impact of anthropogenic activities on land uses. In the second part of this work, we studied the agronomic capacities of plants to tolerate, absorb and accumulate these pollutants by reconstituting artificial grounds contaminated with these compounds. In our study we used oats as plant tests. The oats seedlings are in certain well-developed cases and have a size and a color similar to that of the pilot grounds. The results obtained show a reduction in the concentration of PCBs after treatment and the plants planted in these decontaminated grounds give good flowerings.

Keywords: Polychlorinated Biphenyls; Concentration; Soil; Algeria
A BACTERIAL POLYSACCHARIDE FOR WATER SAVING IN THE RHIZOSPHERE OF ARID SOILS

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Bacterial polysaccharides have attracted a great deal of interest among scientists in recent years. These biomolecules are generally very hydrophilic biodegradable and biocompatible with different properties that are exploited in different industrial fields. They can develop high viscosities at low concentrations. As a result they are widely used as texturizing or stabilizing agents in the food cosmetic and pharmaceutical industries. They also have water retention properties used in pharmacology and agriculture. In the present work we describe an experimental investigation about the viscosity of a polysaccharide produced by a rhizospheric bacterial strain isolated from a semi-arid region of Algeria. The polysaccharide productivity by bacterial strains on a sucrose medium was used as a criterion of choice. The isolated strain CHL 0102 was identified phenotypically and genotypically. Evaluation of the potential of the polysaccharide produced by strain CHL0102 in the improvement of the soil structure was determined by the study of: (i) water absorption capacity of the dry polysaccharide after water saturation (WAC) (ii) and its viscosity. The 16S rRNA gene sequence of this strain shared a similarity of 99% with Paenibacillus polymyxa. The polysaccharide productivity was estimated at 7 g.L⁻¹ dry weight after one week. The polysaccharide secreted by the strain Paenibacillus polymyxa CHL 0102 has the capacity to absorb 300 times water of its weight. The aqueous solutions of this EPS displayed a decrease in viscosity as a function of the decrease in the EPS concentration respectively 35 and 16 mPa.s for the concentrations studied 4 and 2 g.L⁻¹. Also we noted a decrease of the viscosity at different concentration by increasing the shear rate. This behaviour reflects the character of non-Newtonian fluids with shear properties. Through to its water absorption capacity and its viscosity this EPS could represent an interesting candidate for the agriculture field.

Keywords: bacterial polysaccharide; rhizosphere; arid soil; water saving
EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF AQUEOUS INFUSION EXTRACT OF *DEVERRA SCOPARIA* COSS. & DUR. (TAMANRASSET, ALGERIA)

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The purpose of this study was to determine the anti-inflammatory properties of *Deverra scoparia* Coss. & Dur and the phenolic compounds involved. Anti-inflammatory activity was assessed by carrageenan-induced paw oedema test at the doses of 250, 500 and 1000 mg/kg, while the bioactive compounds in the extract were identified with High Performance Liquid Chromatography (HPLC) analysis. The extract produced significant and dose-dependent percentage inhibition of carrageenan-associated caused oedema was produced at 250 (52.22 %), 500 (66.13 %) and 1000 (73.52 %) mg/kg while the reference drug Diclofenac sodium exhibited a less potent anti-inflammatory activity (with 47.95 % inhibition. HPLC analysis revealed the presence of two phenolic acids, salicylic acid (21.81 mg/g dry weight) and rosmarinic acid (28.44 mg/g dry weight); and apigenin, a flavonoid aglycone (5.70 mg/g dry weight). These results indicate that infusion extract of *Deverra scoparia* Coss. & Dur possesses significant anti-inflammatory potential which may be due to the presence of phenolic compounds (apigenin, salicylic acid and rosmarinic acid).

**Keywords:** *Deverra scoparia* Coss. & Dur.; Anti-inflammatory; HPLC; Phenolic compounds
AUTOMATIC IRRIGATION SYSTEM FOR TOMATO SEEDLING PRODUCTION

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The seedling production stage is a critical point in the vegetable production system. Obtaining high quality seedlings is a prerequisite for subsequent cropping to occur well and productivity optimization is required. Among the various cultural practices important to the cultivation of seedlings is water management. The practice of irrigation is indispensable and requires a duly adjusted quality irrigation system, together with a specific water management plan to meet the water demand of the crop. Irrigation management in seedling management requires a great deal of specific information, especially when it involves the use of inputs such as hydrorentering polymers and automation technologies of the data acquisition and irrigation system. Looking for more information about water management in this production scenario, studies were conducted in a protected environment at the Federal University of Viçosa, Viçosa - MG. Tomato seedlings (Lycopersicon esculentum Mill) were produced in plastic trays of 128 cells, suspended at 1.25 m from the ground. The seedlings were irrigated by 4 microwellers of fixed jet 360º per tray, duly isolated by sideboards, following the methodology developed for this work. During Phase 1, in January / February 2017 (duration of 24 days), the cultivation coefficient (Kc) of seedlings cultured in the presence and absence of hydrogel was evaluated by weighing lysimetry. In Phase 2, September 2017 (duration of 25 days), the seedlings were submitted to 4 irrigation managements (Kc, timer, 0.50 ETo and 1.00 ETo), in the presence and absence of hydrogel and then evaluated in relation to quality parameters. The microclimate inside the greenhouse was monitored with the use of air temperature, relative humidity and global radiation sensors connected to a microcontroller that performed hourly calculations of reference evapotranspiration by Penman-Monteith standard method FAO56 modified for the balance of long waves according to Walker, Aldrich, Short (1983), and conducted water balance and irrigation decision making for each experimental treatment. Kc of seedlings cultured on substrate with hydrogel (1.55) was higher than Kc on pure substrate (1.39). The use of the hydrogel was a differential for the production of earlier tomato seedlings, with higher final height, larger diameter of colon, greater accumulation of dry mass of shoot, larger area of crown projection and greater the rate of relative growth of part aerial. The handling 1.00 ETo promoted higher relative growth rate of aerial part.

Keywords: Irrigation management; water productivity; irrigation engineering.
IMPACT OF EXOGENOUS PROLINE ON THE PHYSIOLOGICAL BEHAVIOR OF FENUGREEK (TRIGONELLA FOENUM-GRAECUM) SEEDLINGS SUBJECTED TO HERBICE STRESS

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The use of herbicides in agricultural practice has allowed considerable time and productivity gains. However, the massive use of these molecules is often damaged to cultivated plants and to the environment. Plants subject to herbicides produce reactive oxygen species (ROS), which cause an oxidative stress to the plants. Many work on various species have demonstrated the ameliorative effect of the exogenous proline in stress conditions. But to our knowledge there has been no work on the contribution of exogenous proline in plants subjected to Xenobiotics. We studied the role of exogenous proline in conferring herbicide stress tolerance in fenugreek (Trigonella foenum-graecum) seedlings.

Trigonella foenum-graecum is an annual crop, self-pollinating and dicotyledonous plant belonging to the subfamily Papilionaceae of the Leguminaceae (Fabaceae) family. It is as one of the oldest cultivated medicinal plants identified in written history, and many studies showed that the seeds acquire anti-oxidant properties in seeds and leaves of fenugreek. Bentazone {3-isopropyl-1H-2, 1, 3-benzothiadiazin-4(3H)-one-2, 2-dioxide} categorized under thiadiazine group of chemicals is a selective herbicide which is used at post emergence applications to control dicotyledonous weeds in agricultural practice. It affects electron transport through photosystems II leading to ROS generation potentially damaging. Our study show the effects of exogenous proline (7mM) on the physiological and biochemical behavior of fenugreek seedlings subjected to 100 µM of bentazone. These effects were evaluated through the evaluation of photosynthetic pigment content (chlorophylls and carotenoids), malondialdehynde (MDA) level and electrolyte leakage, proline content, and the catalase activity. The results obtained show that the herbicide stress affects the majority of the studied parameters. However, the addition of exogenous proline minimizes the damage caused by the herbicide on the membranes (MDA level, electrolyte Leakage), decreases proline content and catalase activity and increases the pigment content. These results suggest the capacity of the exogenous proline to improve the tolerance of the plants subjected to herbicide stress.

Keywords: exogenous proline; bentazone; Trigonella foenum-graecum; lipid peroxidation catalase
BIOFLAVONOIDS AND FATTY ACIDS PROFILING OF DATE PALM SEEDS 
(*PHŒNIX DACTYLIFERA L.*) FROM ALGERIAN SAHARA

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This study is aims phytochemical analysis of methanolic and lipophilic extracts of date palm seeds (*Phoenix dactylifera* L.), growing in South-western of Algerian Sahara. Date palm (Takerbucht cultivar) seeds bioflavonoid assay indicates that the respective contents, expressed in mg of cyanidin for anthocynidins, of orientin for C-glycosides and of quercetin for flavonic aglycons per g of dry vegetable matter are equal to (6.16 ± 0.27), (2.59 ± 0.22) and (45.76 x 10^-3 ± 0.05). High Performance Liquid Chromatography (HPLC) revealed the presence (% area) of five bioflavonoids in date palm seeds methanolic extracts: Quercetin (57.36 %), Luteolin (16.18 %), Isorhamnetin (7.33 %), Chrysoeriol (7.03 %) and Tricin (2.1 %). In addition, gas chromatography - mass spectrometry (GC-MS) detected twenty-eight volatile substances in the lipophilic extracts of seeds. Saturated fatty acids (49.69 ± 0.83 %) are dominated by lauric (19.93 ± 0.21 %), myristic (12.18 ± 0.13 %) and palmitic (11.37 ± 0.11 %) acids; while unsaturated fatty acids (44.69 ± 0.37 %) are characterized by oleic (39.19 ± 0.20 %) and linoleic (8.42 ± 0.09 %) acids. The oil extracted from date palm seeds (Takerbucht cultivar) growing in South-western of Algerian Sahara is saturated and unsaturated nature with oleic and lauric acids dominance. In view of these results, the date palm seeds represent a significant potential for bioactive natural molecules; the recovery of this by-product in the pharmaceutical and food industries as natural additives or functional foods could be considered.

**Keywords:** date palm seeds; bioactive substances; bioflavonoids; fatty acids; HPLC and GC-MS analysis.
STRUCTURAL AND PHYSIOLOGICAL ASPECT OF THE POLYSACCHARIDE PRODUCED BY P FLUORESCENS STRAIN TF7 ISOLATED FROM AN ARID REGION OF ALGERIA

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Bacteria and in particular rhizospheric bacteria (PGPR) are known for their ability to synthesize biomolecules. However, these PGPR have the competence to solubilize inorganic phosphorus, a crucial element which is important to promote growth and increase crop yields. The objective of this study is to select an adaptive strain to the constraints of erratic rainfall and large temperature variations and to determine the possible synergistic effects of its EPS and organic acid on tricalcium phosphate (TCP) solubilization. The strain TF7 isolated from an arid region of Algeria was characterized on the basis of its morphological and physiological traits. Polysaccharide production and the phosphate-solubilizing activity of the strain were evaluated using sucrose and tricalcium phosphate. This EPS was studied by sugar analysis as well as proton NMR spectra. The maximum polysaccharide productivity was estimated at 4.5 g/L after 5 days. The analyzed sugar was comprised of fructose, glucose, and mannose in a ratio of 4:1:0.6. NMR spectra indicated that the polysaccharide produced by the strain was levan with β (2, 6)-linked fructose units in accordance with the generally accepted structure. The strain TF7 solubilizes phosphate and forms a clear halo around the colony. The phosphate-solubilizing index is 2.33.

Keywords: Rhizosphere. Pseudomonas; Physiological characteristics; Extracellular polysaccharide Levan; Phosphate-solubilizing activity
EFFECTS OF PHOSPHORUS ON BIOMASS AND SYMBIOTIC FREQUENCY OF CHICKPEA GROWING UNDER SALT STRESS

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The extent of agricultural land that is affected by high salinity is increasing worldwide, due to both natural phenomena and agricultural practices such as irrigation systems. In Algeria the salinity affects the productivity of legumes, particularly in arid and semi-arid zones. Salinity poses three major threats to plant growth: osmotic stress, ionic stress and an oxidative stress. The improvement of tolerance of chickpea to salt stress depends on various environmental and cultural conditions such as soil properties, seat of chemical reactions between the essential elements for the growth of plants. This investigation was undertaken to evaluate the effect of phosphorus fertilization on plant growth and symbiosis traits of chickpea Cicer arietinum L. in interaction with Rhizobia growing under salt stress. This ecological phenomenon assesses the enrichment of plants in proteins and reduces the use of chemical nitrogen fertilizers (Hulse, 1991). Seed of Cicer arietinum L. are cultivated in the soil of ITGC institute (Algiers). The trial was laid out following a randomized block design with three replicates. Before nodulation stage, seedlings are irrigated with different treatments of phosphorus (0, P1: 90kg h⁻¹, P2: 200Kg h⁻¹), NaCl levels (C: 0mM, S: 50mM) and combinations (SP1 and SP2). After 2 months, the plants were analyzed by measuring the plant biomass, relative water content and nodulation frequency. Salinity decreased the dry biomass of the plants and the relative shoot growth was more affected than root in comparison with control. Besides, 50mM of NaCl significantly reduced nodule number (−50%) compared to the control plants while an inversely proportional relationship was found between relative water content and stomata opening under salt stress. However, application of two phosphorus levels to saline soil enhanced growing conditions of plants. Particularly, the 90 kg ha⁻¹ of P × 50mM NaCl combination significantly increased plant growth, nodulation frequency (65%), reduced relative water content. A significant increase was observed in plants development at both phosphorus doses combined with salt stress compared to salt stress alone. Statistically, the low P (90 Kg h⁻¹) level combined with salinity induced similar responses of plants. Finally, the results found here support the roles of phosphorus fertilizer in the alleviation of salt stress and enhancing the soil quality for better symbiosis efficiency of chickpea.

Keywords: salt stress; phosphorus; relative water content; nodulation frequency; growth.
ANTIBACTERIAL ACTIVITY AND CHEMICAL COMPOSITION OF VOLATILES OF *ANETHUM GRAVEOLENS* L. GROWING WILD IN ALGERIA

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*Anethum graveolens* L. which belongs to Apiaceae family is a widespread wild plant in North Africa, Europe and Asia. It has been used for thousands of years in Ayurvedic Hindu traditional medicine, where it is used in more than 50 medicinal and aromatic preparations. According to various experimental studies in vitro and in vivo, due to the presence of biologically active compounds, the essential oil of *Anethum* possesses various biological activities: Antibacterial, Antifungal, Antioxidant, Insecticides, Anti-inflammatory, Antispasmodic and Antidiabetic. The subjects of this contribution are analysis of essential oil of *Anethum graveolens* and study their antibacterial activity. Volatile fraction was isolated by hydrodistillation, and identification of major compounds of oil was obtained by GC/MS. α-phellandrene (29%), fenchone (19%), limonene (16, 6%), α-pinene (9,5%) and myrcene (4,7%) were found as important components. Essential oil of *Anethum graveolens* shows a good antibacterial activity against Gram-positive and Gram-negative bacteria. Inhibition zones are 17 to 21 mm for Gram-positive bacteria and 13 to 21 mm for pathogenic Gram-negative bacteria.

**Keywords:** Anethum graveolens; essential oil; antibacterial activity
CHEMICAL VARIABILITY OF AERIAL PART AND ISOLATED LEAVES ESSENTIAL OILS FROM HAPLOPHYLLUM TUBERCULATUM (FORSSK) A. JUSS DURING THE FLOWERING STAGE AND THEIR IMPACT AGAINST ANTIOXIDANT ACTIVITY

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Haplophyllum tuberculatum (Forssk.) A. Juss. Grows in Algeria, throughout the country and especially on rocky slopes of arid regions. It used to treat different diseases as well as digestive problems, and rheumatoid arthritis. The biosynthesis of the secondary metabolites of haplophyllum tuberculatum essential oils were influenced by many factors (soil, climatic condition, biotype and chemotype of the plant and organ) which influence consequently the biological activity (e.g. the antioxidant activity). In our study Haplophyllum Tuberculatum samples were collected at flowering stage from Kasdir region of Algeria. GC-MS analysis showed qualitative and quantitative variation of chemical compounds. The main components were limonene (10.19% -12.68%), alpha – Phellandrene (7.39- 9.46%), 2, 4-BIS (1, 1-dimethylethyl)-phenol (6.54 – 8.33 %), and myrcene (6.42- 8.58 %). The antioxidant activity has been determined by five tests namely inhibition of radicals DPPH and ABTS, reducing power, beta – carotene bleaching and chelating ability on ferrous ions. Ours results showed that all essential oils have promising antioxidant activity.

Keywords: haplophyllum tuberculatum; essential oil; antioxidant activity; GCMS analysis
EVALUATION OF BIOGAS RECOVERY USING ANAEROBIC DIGESTION OF BIODEGRADABLE FOOD WASTES

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Organic food wastes are an interesting feedstocks for bioenergy production through anaerobic digestion as they are continuously generated from residential and commercial sources and contain a large ratio of biodegradable materials. The produced biogas can be used directly for heat and/or electricity production or can be upgraded to biomethane for application as biofuels or for injection in gas network. The main objectives of this investigation are to optimize a continuous anaerobic digestion process for food wastes recovery. Parameters such as acidity, alkalinity, chemical oxygen demand and methane production were analyzed in order to control the process performances. Results show that the production is steadied after an operating time of 20 days using a thermophilic continuously stirred digester. The biogas production reaches an average value of 630 ml for a daily inlet feedstock of 50 g and about 190 ml /day of methane have been recorded after process stabilization.

Keywords: Biogas; Anaerobic Digestion; Continuous process; Food waste.
CHEMICAL COMPOSITION OF ESSENTIAL OILS OF *EUCALYPTUS BOSISTOANA* LEAVES, AND TWIGS OBTAINED BY HYDRODISTILLATION AND MICROWAVE-ASSISTED HYDRODISTILLATION

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Two different extraction methods were used for a comparative study of *Eucalyptus bosistoana* leaves and twigs essential oils: microwave-assisted hydrodistillation (MAHD) and conventional hydrodistillation (HD). The leaves were rich in essential oil (1.77% and 1.59%) than the twigs (0.68%). The essential oils were analyzed by capillary GC and GC-MS. The compounds were identified according to their retention indices and mass spectra (EI, 70eV). A total of sixty compounds were identified representing over than 90% of the oils in each sample. The essential oils of leaves obtained by the two methods were riche in oxygenated components. The dominate classes were alcohols and oxides. The main compounds were 1,8cineol (47.5% and 60.8%), trans-pinocarveol (8.4% and 8.9%) and globulol (11.0% and 3.6%) respectively in oils extracted by HD an MAHD. In the twigs oils the major compounds were p-cymene (37.1%), globulol (13.2%), and 1,8cineol (10.5%). The results obtained allowed a reliable differentiation between the essential oils obtained by the two extraction methods and from the differents organes. The antioxidant activity of the methanolic extracts of *Eucalyptus viminalis* leaves, was investigated by free radical scavenging assay using 2,2-diphenyl-1-picrylhydrazyl radical (DPPH). All samples showed a relatively weak antioxidant activity in comparison to that of the synthetic antioxidant (BHT).

**Keywords**: GC; GC-MS; Essential oils Analysis; *Eucalyptus bosistoana*
ANALYSIS BY CAPILLARY GAS CHROMATOGRAPHY OF NATURAL SUBSTANCES USING A NEW LIQUID CRYSTAL AS STATIONARY PHASE

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Application of a nematic liquid crystal used as stationary phase in capillary gas chromatography is investigated using some volatile natural products. The structure of the mesogenic compound is shown in the figure.

Structure of liquid crystal

The characterization of the liquid crystal was made using 1H NMR and mass spectrometry. Transition temperatures are determined by differential scanning calorimetry (DSC). The liquid crystal exhibit a nematic phase within a large temperature range and interesting analytical performances. This liquid crystal stationary phase has shown interesting separations of positional and geometric isomers of volatile aromatic compounds.

In the nematic phase, the molecules "liquid crystal" are oriented along an axis parallel and, due to their molecular structure elongated in the nematic temperature range, the more elongated isomers undergo more interactions with the nematic phase aligned to the isomers bulky molecules. This finding was observed with the position and geometric isomers contained in the essential oils. According to the obtained separations, particularly for the volatile product isomers, this new phase stationary liquid crystal presents distinctly more interesting chromatographic properties than the conventional phases.

Keywords: Capillary Gas Chromatography; Liquid Crystal; Stationary Phase
APPLICATION OF LIQUID CRYSTALS AS STATIONARY PHASES FOR THE SEPARATION OF VOLATILE COMPOUNDS IN ESSENTIAL OILS

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The synthesis of several nematic liquid crystals was carried out. These mesogenic materials are Schiff’s bases esters and azobenzenes, are listed below:

LC (BS): 4′-(4′-alkyloxybenzoyloxy) benzoloxysalicylidene imine N-propyl
LC (AR): 4′(4′-trans pentyl cyclohexane carboxyloxy) 4′-(4-alkyloxy benzoyloxy)-2′-alkyloxy-3′-methyl azobenzene

Several fused silica capillary columns were then prepared according to the dynamic Risk’s method using the synthesized liquid crystals as stationary phases. These columns were tested in gas chromatography for the separation of volatile components in some essential oils. The results show that the analytical properties of the nematic materials allow an excellent resolution of the natural, mixture constituents, particularly in the case of stationary phases containing azobenzene groups. However, the terminal chain long does not exert any great influence on the separation abilities.

Keywords: Liquid Crystals; Stationary Phases; Volatile Compound; Essential Oil
COMPARATIVE STUDY OF FLOWER ESSENTIAL OILS FROM THE ALGERIAN SWEET ORANGE VALENCIA LATE EXTRACTED BY HYDRO-DISTILLATION AND MICRO-WAVE DISTILLATION PROCESS

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Flowers of the sweet orange Valencia (citrus sinensis (L) Osbeck) were collected during April 2018 from the Fruit-growing Experimental Station at Boufarik region (35 Km South of Algiers). Their essential oils find numerous applications in perfumery, soap-manufactures, cosmetics, pharmacy, and entomology. The essential oils were obtained by hydro-distillation HD (yield = 0.06%) and micro-wave distillation process MW (yield = 0.06%). A combination of GC and GC/MS/EI using HP5-MS fused silica capillary column were carried out to characterize the chemical composition of the two essential oils. Component identification was verified by comparison of mass spectra and Kováts retention indices with previously published spectra (Wiley Nist) and index data. Forty and 52 constituents were respectively identified from HD and MW oils. This study showed predominance of Sabinene (32.28% in HD oil vs 30.04% in MW oil), Limonene (11.33% vs 9.02%), Linalool (7.71% vs 11.08%), 2Z 6E-Farnesol (0.00% vs 11.49%), and E-Nerolidol (0.00% vs 5.79%). In comparison of HD MW extraction offers important advantages: shorter extraction times (150 min vs 30 min respectively) substantial saving of energy, lower production of potential by-products, and better quality of essential oils. Key words: Citrus sinensis (L) Osbeck sweet orange Valencia Flowers Essential oils microwave extraction GC GC/MS/EI.

Keywords: Essential Oil; Algerian Sweet Orange Valencia; extract; Hydro-distillation; Microwave