

# Agricultural Research

Abstract Book

From the 4th Annual International  
Symposium on Agricultural Research

18-21 July 2011,

Athens, Greece.

Edited by Gregory T. Papanikos



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## Preface

This abstract book includes all the abstracts of the papers presented at the *4th Annual International Symposium on Agricultural Research, 18-21 July 2011*, organized by the Athens Institute for Education and Research. In total there were 63 papers and 69 presenters, coming from 24 different countries (Algeria, Austria, Belgium, Canada, Chile, China, Costa Rica, Egypt, Estonia, Finland, Germany, Hungary, India, Iran, Ireland, Malaysia, Mexico, the Philippines, Poland, South Africa, Thailand, Turkey, the United States of America, and Uruguay). The conference was organized into 14 sessions that included areas such as Policy Issues, Crops, Environment, e.t.c. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 100 international conferences and has published over 100 books. Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

**Gregory T. Papanikos**  
**President**





## FINAL CONFERENCE PROGRAM

### Athens Institute for Education and Research Arts & Sciences Research Division Environment & Agriculture Research Unit

**4th Annual International Conference on Agriculture**  
**18-21 July 2011, Athens, Greece**



Conference Venue: Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece

### Organization and Scientific Committee

- Dr. Gregory T. Papanikos, President, ATINER.
- Dr. Nicholas Pappas, Vice-President of Academics ATINER & Professor, Sam Houston University, USA.
- Dr. Costas Stathopoulos, Deputy Head, Environment and Agriculture Research Unit of ATINER & Lecturer, University of Newcastle, Australia.
- Dr. Eva Maleviti, Researcher, ATINER.
- Dr. Theofilos Theophanides, Head, Environment Research Unit, ATINER & Professor, Department of Chemical Engineering, National Technical University of Athens, Greece.
- Dr. John Hayes, Professor, Clemson University, USA.
- Dr. Reha Onur Azizoglu, Postdoctoral Research Associate, College of Veterinary Medicine, North Carolina State University, USA.
- Dr. Salah Er-Raki, Professor, University of Cadi Ayyad, Morocco.
- Ms. Lila Skountridaki, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.

### Administration

Fani Balaska, Chantel Blanchette, Stavroula Kiritsi, Eirini Lentzou,  
Konstantinos Manolidis, Katerina Maraki & Sylia Sakka

## **Monday 18 July 2011**

**08:00-08:30 Registration**

**08:30-09:00 Welcome and Opening Remarks**

- Dr. Gregory T. Papanikos, President, ATINER.
- Dr. Costas Stathopoulos, Deputy Head, Environment and Agriculture Research Unit of ATINER & Lecturer, University of Newcastle, Australia.
- Dr. Nicholas Pappas, Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.

**09:00-11:00 Session I (Room A): Energy Crops-Waste**

**Chair:** Pappas, N., Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.

1. Madani, A., Professor, Nova Scotia Agricultural College, Canada, Gordon, R., Wood, J., Smith, E., Haverstock, M., Carreau, R., & Stratton, G., Nova Scotia Agricultural College, Canada. Using Constructed Wetlands to Treat Agricultural Wastewater.
2. Diepenbrock, W., Full Professor, Martin-Luther-University of Halle, Germany. Energy Balancing in Crop Production.
3. Almodares, A., Associate Professor, University of Isfahan, Iran & Goli, M., Graduate student, University of Isfahan, Iran. Bioethanol Production from Sweet Sorghum under Hot and Dry Climatic Condition.
4. Dallos, A., Associate Professor, University of Pannonia, Hungary, Hoffmann, S., Professor, University of Pannonia, Hungary, Tóth, Z., University of Pannonia, Hungary, Tollar, A.N., University of Pannonia, Hungary, Hoffmann, B., University of Pannonia, Hungary & Marton, C., Agricultural Research Institute of the Hungarian Academy of Sciences, Hungary. Studies on New Corn Hybrids for Bioethanol Industries in Hungary.
5. \*Zekker, I., Ph.D. Student, Institute of Chemistry, University of Tartu, Estonia, Rikmann, E., Institute of Chemistry, University of Tartu, Estonia, Tenno, T., Institute of Chemistry, University of Tartu, Estonia, Menert, A., Tallinn University of Technology, Estonia, Kroon, K., Institute of Chemistry, University of Tartu, Estonia, Tomingas, M., Institute of Chemistry, University of Tartu, Estonia, Vabamäe, P., Institute of Chemistry, University of Tartu, Estonia & Tenno, T., Institute of Chemistry, University of Tartu, Estonia. Anaerobic Ammonium Oxidation Process Performance with Optimum Bicarbonate Concentration.

<p><b>11:00-13:00 Session II (Room A): Crops I</b>  <b>Chair:</b> Maleviti, E., Researcher, ATINER.</p>	<p><b>11:00-13:00 Session III (Room B): Policy Issues I</b>  <b>Chair:</b> Kefalaki, M., Researcher, ATINER.</p>
<ol style="list-style-type: none"> <li>1. Johnston, W., Professor, Washington State University, USA, Dodson, K.L., Washington State University, USA, Silbernagel, D.A., Washington State University, USA, Johnson, R.C., Washington State University, USA &amp; Golob, C.T., Washington State University, USA. Kentucky Bluegrass (<i>Poa pratensis</i> L.) Germplasm for Seed Production without Field Burning.</li> <li>2. Modhej, A., Faculty Member, Islamic Azad University, Shoushtar Branch, Iran &amp; Jafari, S., Islamic Azad University, Shoushtar Branch, Iran. Effect of Common Mallow (<i>Mava spp</i>) Competitiveness on Grain Yield and Yield Components in Wheat under Different Levels of Nitrogen.</li> <li>3. Suheri, S., Research Assistant, Selcuk University, Turkey, Yavuz, D., Research Assistant, Selcuk University, Turkey &amp; Topak, R., Professor, Selcuk University, Turkey. Determining Yield Response Factor of Sugarbeet in Konya Region.</li> </ol>	<ol style="list-style-type: none"> <li>1. Gajewska, M., Ph.D. Student, Wroclaw University of Economics, Poland. The Agricultural Productive Cooperatives in Poland.</li> <li>2. Kalandarova, U., Researcher, University College Cork, Ireland. Analysis of community based rural development project implemented by LEADER program: Case Study in North Tipperary region, Ireland.</li> <li>3. Grammatikopoulou, I., Researcher, MTT Agrifood Research, Finland, Sami, M., Researcher, MTT Agrifood Research, Finland &amp; Eija, P., Professor, Researcher, MTT Agrifood Research, Finland. How Does the Proximity of a Field Plot Affect Land-Use Choices? Using Stated Preference Data to Examine Landowners' Preferences.</li> </ol>

**12:30-13:30 LUNCH**

<p><b>14:00-16:00 Session IV (Room B): Soil</b>  <b>Chair:</b> Grammatikopoulou, I., Researcher, MTT Agrifood Research, Finland</p>
<ol style="list-style-type: none"> <li>1. Sager, M., Deputy Head, Austrian Agency for Health and Food Safety (AGES), Austria. Input of Accessory Elements from Various Mineral and Organic Fertilizers to Arable Soils.</li> <li>2. Seyedashrafy, H., M. Sc. Student, Young Researchers Club, Arak Branch, Islamic Azad University, Arak, Iran, Majidian, M., Department of Crop Production and Plant Breeding, College of Agriculture, University of Guilan, Rasht, Iran, Baghaie, A.H., College of Agriculture and Natural Resources, Islamic Azad University, Arak Branch, Arak, Iran &amp; Gomarian, M., College of Agriculture and Natural Resources, Islamic Azad University, Arak Branch, Arak, Iran. Soil Extractable Zn and the Translocation Factor in the Barley as Affected by Organic and Inorganic Zn Sources.</li> <li>3. Majidian, M., Assistant Professor, University of Guilan, Rasht, Iran, Tarighi, H., Student, Islamic Azad University, Arak Branch, Young Researchers Club, Arak, Iran, Baghaie, A.H., Islamic Azad University, Arak Branch, Department of Agronomy and Plant Breeding, Arak, Iran &amp; Gomarian, M., Islamic Azad University, Arak Branch, Department of Agronomy and Plant Breeding, Arak, Iran. Zn Efficiency in Two Wheat Cultivars in Soil Amended with Organic and Inorganic Amended Soil.</li> <li>4. Abdel-Salam Mahmoud, M.S., Head of Microbial Genetics Department, National Research Centre, Egypt. Extension of Rhizobial/plant Host Range and Symbiosis Improvement via Plasmid Transfer.</li> <li>5. Guzman Hernandez, T., Professor, Instituto Tecnológico de Costa Rica, Costa Rica. Diagnosis and Population Dynamics of Nematodes in Two Pineapple Crop Systems in Costa Rica.</li> <li>6. Gonzales, N.A, Researcher, Ifugao State University (IFSU), Philippines. Shell Power: Managing the Giant Earthworms (<i>Pheretima Elongata</i>) with <i>Melanoides Granifera</i> to Save the Ifugao Rice Terraces (Irt).</li> </ol>

<p><b>16:00-17:30 Session V (Room A): Crops II</b>  <b>Chair:</b> Anil Kumar, H. V., Associate Professor, DVS College of Arts &amp; Science, India.</p>	<p><b>16:00-17:30 Session VI (Room B): Environment I</b>  <b>Chair:</b> Sager, M., Deputy Head, Austrian Agency for Health and Food Safety (AGES), Austria.</p>
<ol style="list-style-type: none"> <li>1. Garcia Lamothe, A., Principal Researcher, National Agriculture Research Institute, Uruguay &amp; de Ackermann, M.D., Researcher, National Agriculture Research Institute, Uruguay. Nitrogen Fertilization and Chemical Fungal Disease Control in No-Till Wheat.</li> <li>2. Chan, L.-K., Lecturer, University Sains Malaysia, Malaysia. In Vitro Culture System For The Production of Artemisinin From <i>Artemisia Annu L.</i>: An Important Anti-Malarial Plant.</li> <li>3. *Babadoost, M., Professor, University of Illinois at Urbana-Champaign, USA. Phytophthora Blight (<i>Phytophthora capsici</i>) of Pepper and Its Management.</li> <li>4. Fang, S., Associate Research Fellow, Chinese Academy of Meteorological Sciences, China &amp; Guili, H., Chinese Academy of Meteorological Sciences, China. Winter Wheat Yields Decline with Spring Higher Night Temperature by Controlled Experiments.</li> <li>5. Karaca, M., Ph.D., Selcuk University, Turkey &amp; Guncan, A., Professor, Selcuk University, Turkey. Economic Thresholds of <i>Bifora Radians</i> Bieb. and <i>Centaurea Depressa</i> Bieb. in Winter Wheat Fields.</li> </ol>	<ol style="list-style-type: none"> <li>1. Jimenez-Sierra, C.L., Professor, Universidad Autónoma Metropolitana-Iztapalapa, Mexico. Mexican Cactaceae and the Risks they are Facing.</li> <li>2. Araya, J., Professor, Universidad de Chile, Chile, Huerta, A., Professor, Universidad de Chile, Chile, Puga, K., Forestry Engineer, Universidad de Chile, Chile &amp; Gazmuri, C., Ph.D. Student, Universidad de Chile, Chile. Assessment of Damage by Insects and Fungi from <i>Austrocedrus chilensis</i> (Cupressaceae) in Central Chile.</li> <li>3. Alfaro, M., Associate Professor, University of Puerto Rico, USA &amp; Estrella-Riollano, A., Graduate Student, University of Puerto Rico, USA. Ecological Significance of the Asian Clam <i>Curbicula Fluminea</i>, an Aquatic Invasive Species of Puerto Rico, on the Community Structure in a Tropical Freshwater Reservoir.</li> <li>4. Huddle, J., Assistant Professor, University of Nebraska, USA, Awada, T., University of Nebraska, USA, Martin, D., University of Nebraska, USA, Zhou, X., University of Nebraska, USA, Smith, T., University of Nebraska, USA &amp; Stockton, R., Southwest Nebraska Resource Conservation and Development, USA. How Overstory Cover and Thinning Impacts Understory Vegetation in a Riparian Forest in Nebraska, USA.</li> <li>5. Gilbert, S., Ph.D. Student, University of Turku, Finland, Norrdahl, K., University of Turku, Finland &amp; Martel, J., York University, Canada. Only Extreme Vole Densities Limit the Establishment of Long-lived Plants in Riparian Field Margins.</li> <li>6. Gwata, E.T., Senior Lecturer Scientist, University of Venda, South Africa &amp; Mzezewa, J., The University of Venda, South Africa. Implications for Crop Production at a Semi-arid Ecotope in the Limpopo Basin in South Africa.</li> <li>7. Karami, M., Assistant Professor, Sabzevar Tarbiat Moallem University, Iran &amp; Baaghdeh, M., Assistant Professor, Sabzevar Tarbiat Moallem University, Iran Studying the Possibility of Using the NDVI Index to Analyze and Monitor Droughts in Esfahan Province, Iran.</li> </ol>

**17:30-19:30 Session VII (Room B): Animals**

**Chair:** Alfaro, M., Associate Professor, University of Puerto Rico, USA

1. Afrasiabi Navan, Z., Associate Professor, Lincoln University, USA. Gold Nanoparticle Based Nanosensor for Accurate Detection of Luteinizing Hormone.
2. Kocaturk, M., Ph.D. Student, Veterinary Medicine of Uludag University, Turkey, Yilmaz, Z., Professor, Veterinary Medicine of Uludag University, Turkey, Eralp, O., Veterinary Medicine of Uludag University, Turkey, Cansev, M., Uludag University, Turkey & Ceron, J.J., Veterinary Medicine of Murcia University, Spain. Effects of Intravenous Choline Treatment on Acute Phase Proteins and Cardiac Function in Dogs with Endotoxemia.
3. Abdel-Rahman, S.M., Associate Professor, Genetic Engineering and Biotechnology Research Institute, Egypt. Efficiency of Bovine IGF-I Gene in the Improvement of Milk Productivity Using Marker-Assisted Selection (MAS).
4. Hassanein, K., Lecturer, Assiut University, Egypt. Histopathological Effects of 2,4-Dichlorophenoxyacetic Acid on Sprague -Dawley Rats with a Special Reference to its Possible Carcinogenicity.

**21:00-23:00 Greek Night and Dinner**

## **Tuesday 19 July 2011**

<p><b>08:00-10:30 Session VIII (Room A): Crops III</b>  <b>Chair:</b> *Zekker, I., Ph.D. Student, Institute of Chemistry, University of Tartu, Estonia</p>	<p><b>08:00-10:30 Session IX (Room B): Environment II</b>  <b>Chair:</b> *Ruiz Rojas, J.L., Professor, University Autonoma of Chiapas, Mexico.</p>
<ol style="list-style-type: none"> <li>1. Adeli, A., Research Soil Scientist, United States Department of Agriculture, Agricultural Research Service, USA, Brooks, J.P., Microbiologist, United States Department of Agriculture, Agricultural Research Service, USA &amp; Jenkins, J., Researcher Leader, United States Department of Agriculture, Agricultural Research Service, USA. Animal and Industrial By-Products Management Strategies for Sustainable Agricultural Production System and Environmental Quality.</li> <li>2. Ashouri, M., Assistant Professor, Islamic Azad University, Lahijan Branch, Iran. Effects of Nitrogen Fertilizer Levels on Nitrogen Use Efficiency and Yield of Rice under Different Irrigation Regimes.</li> <li>3. Gokbayarak, Z., Associate Professor, Çanakkale Onsekiz Mart University, Turkey, Soylemezoglu, G., Associate Professor, Ankara University, Turkey, Cakir, A., Associate Professor, Ankara University, Turkey &amp; Ergul, A., Associate Professor, Ankara University Biotechnology Institute, Turkey. Virus Free Grape Plants Display Different Enzyme Profiles and Graft Compatibility Ratios with Rootstocks.</li> <li>4. Pobudkiewicz, A., Scientist, Institute of Horticulture, Poland. The Influence of Flurprimidol on Pot Chrysanthemum Growth and Reduction of Water Consumption by Plants.</li> <li>5. Nzungize Rusagara, J., Ph.D. Student, University of Liege, Belgium &amp; Gepts, P., University of Liege, Belgium, Buruchara, R., University of Liege, Belgium, Buah, S., University of Liege, Belgium, Ragama, P. University of Liege, Belgium, Busogoro, J.P., University of Liege, Belgium &amp; Baudoin, J.P. University of Liege, Belgium. Pathogenic and Molecular Characterization of Pythium Species Inducing Root Rot Symptoms of Common Bean in Rwanda.</li> </ol>	<ol style="list-style-type: none"> <li>1. Seraiche-Dahamna, S., Professor, University Ferhat Abbas, Algeria, Bouamra, D., Professor, University Ferhat Abbas, Algeria, Harzallah, D., Professor, University Ferhat Abbas, Algeria, Machtoub, R., Student, University Ferhat Abbas, Algeria &amp; Mahdaoui, B., Student, University Ferhat Abbas, Algeria. Toxicity of Expired and Unexpired Trichlorfon: A Comparative Study.</li> <li>2. Westerdahl, B., Professor, University of California, USA. Cultural and Biological Methods for Management of Plant Parasitic Nematodes.</li> <li>3. Yang, Y.F., Professor, Jinan University, China. Mariculture Development and Environmental Protection of the Coastal Waters in China.</li> <li>4. Vuddhakul, V., Associate Professor, Prince of Songkla University, Thailand, Thongchankaew, U., Prince of Songkla University, Thailand, Srinitiworawong, K. Prince of Songkla University, Thailand &amp; Plathong, S., Prince of Songkla University, Thailand. Investigation of <i>Vibrio</i> spp. at the Andaman Sea, Thailand.</li> <li>5. Mzezewa, J., Lecturer, University of Venda, South Africa &amp; Gwata, E.T., Senior Lecturer Scientist, University of Venda, South Africa. Characterization of the Long-Term Rainfall Pattern at a Semi-Arid Ecotope in the Limpopo Basin in South Africa.</li> <li>6. Yavuz, D., Research Assistant, Selcuk University, Turkey, Suheri, S., Research Assistant, Selcuk University, Turkey &amp; Topak, R., Professor, Selcuk University, Turkey. Determining Energy Consumption of Sprinkler Irrigation in Different Crops at Konya Plain.</li> </ol>

<p><b>10:30-12:00 Session X (Room A): Crops IV</b>  <b>Chair:</b> Gwata, E.T., Senior Lecturer Scientist, University of Venda, South Africa.</p>	<p><b>10:30-12:00 Session XI (Room B): Policy Issues II</b>  <b>Chair:</b> Westerdahl, B., Professor, University of California, USA.</p>
<ol style="list-style-type: none"> <li>1. Panasiewicz, K., Professor, Poznań University of Life Sciences, Poland, Koziara, W., Professor, Poznań University of Life Sciences, Poland &amp; Sulewska, H., Professor, Poznań University of Life Sciences, Poland. The Reaction of Different Forms of Oats to Sprinkler Irrigation and Nitrogen Fertilization.</li> <li>2. Ozaslan Parlak, A., Associate Professor, Canakkale Onsekiz Mart University, Turkey, Gökkuş, A., Canakkale Onsekiz Mart University, Turkey &amp; Ayhan, C., Canakkale Onsekiz Mart University, Turkey. Effects of Presowing Treatments on Germination of Seeds of Onobrychis Species.</li> <li>3. Anil Kumar, H. V., Associate Professor, DVS College of Arts &amp; Science, India &amp; Munirajappa, Professor, Bangalore University, India. Morphometric Biomass and Nutritive Evaluation of EMS Mutagenised Morus Species (Genotype RfS<sub>135</sub>).</li> <li>4. Subramaniam, S., Senior Lecturer, University Sains Malaysia, Malaysia, James, J., Postgraduate Student, University Sains Malaysia, Malaysia, Keng, C.L., University Sains Malaysia, Malaysia &amp; Rathinam, X., AIMST University, Malaysia. Cryopreservation of Dendrobium Bobby Messina Protocorm- Like Bodies by Encapsulation-Dehydration Technique.</li> <li>5. Ozpinar, A., Professor, Canakkale Onsekiz Mart University, Turkey, Serez, M., Professor, Canakkale Onsekiz Mart University, Turkey, Polat, B., Professor, Canakkale Onsekiz Mart University, Turkey &amp; Ozpinar, S., Professor, Canakkale Onsekiz Mart University, Turkey. Leafminer (<i>Cameraria ohridella</i> Deschke &amp; Dimic, 1986, Lepidoptera: Gracillariidae), the pest of horse chestnut (<i>Aesculus hippocastanum</i>) in Marmara Region of Turkey.</li> </ol>	<ol style="list-style-type: none"> <li>1. Shirmohammadi, A., Professor &amp; Associate Dean, University of Maryland, USA &amp; Wei, C.I., Professor and Dean, University of Maryland, USA. Environmental Challenges for Agro-Ecosystems and Research Opportunities.</li> <li>2. *Ruiz Rojas, J.L., Professor, University Autonoma of Chiapas, Mexico. Development Perspectives for Production of Organic Milk in the State of Chiapas, Mexico.</li> <li>3. Vassalos, M., Ph.D. Student, University of Kentucky, USA &amp; Dillon, C.R., Professor, University of Kentucky, USA. Going Organic or Conventional? A Case Study for the Farm Specific Factors Affecting the Transition to Organic Farming in Lake Kerkini Region: Greece.</li> <li>4. Konyali, A., Academic, Çanakkale Onsekiz Mart University, Turkey. A Woman's Point of View on Goat Production.</li> </ol>

<b>12:00-14:00 Session XII (Room A): Crops V</b> <b>Chair:</b> Shirmohammadi, A., Professor & Associate Dean, University of Maryland, USA	<b>12:00-14:00 Session XIII (Room B): Microbiology - Entomology</b> <b>Chair:</b> Vassalos, M., Ph.D. Student, University of Kentucky, USA
<ol style="list-style-type: none"><li>1. Ozpinar, S., Professor, Canakkale Onsekiz Mart University, Turkey &amp; Ozpinar, A., Professor, Canakkale Onsekiz Mart University, Turkey. Impact of Agronomic Practices on Weeds of Winter Wheat-Vetch/Maize Rotation in a Semiarid Region: Tillage Systems.</li><li>2. Vellidis, G., Professor, University of Georgia, USA. Variable Rate Application of Nitrogen on Cotton in Georgia, USA.</li></ol>	<ol style="list-style-type: none"><li>1. *Bastos, A., Associate Professor, University of Pretoria, South Africa &amp; Lubisi, B.A., Head of Virology, ARC-Onderstepoort Veterinary Institute, South Africa. Molecular Evolutionary Analyses of the Genotype I Virus Causing Widespread, Historical African swine fever Outbreaks Provides Insights into the Sylvatic Origin and Spread of the Virus.</li><li>2. Huerta, A., Professor, University of Chile, Chile, Chiffelle, I., University of Chile, Chile, Celis, M., University of Chile, Chile &amp; Araya, J.E., University of Chile, Chile. Insecticidal Effect from <i>Schinus molle</i> Leaves Extracts on <i>Xanthogaleruca luteola</i> larvae. (Coleoptera: Chrysomelidae).</li></ol>

#### 14:00-15:00 Lunch

<b>15:00-16:30 Session XIV (Room B): Food</b> <b>Chair:</b> Stathopoulos, C., Deputy Head, Environment and Agriculture Research Unit of ATINER & Lecturer, University of Newcastle, Australia.
<ol style="list-style-type: none"><li>1. Akin, A., Assistant Professor, Selcuk University, Turkey &amp; Cital, O.B., Assistant Professor, Selcuk University, Turkey. Determination of Fatty Acid Composition of Plant Leaf Growth Period of <i>Vitis Vinifera</i> L. Müşküle Grown in Aladağ Valley in Turkey.</li><li>2. Cital, O.B., Assistant Professor, Selcuk University, Turkey &amp; Akin, A., Assistant Professor, Selcuk University, Turkey. Fatty Acid Composition of Three Different Pekmez in Konya, Turkey.</li><li>3. Chockchaisawasdee, S., Lecturer, Loei Rajabhat University, Thailand, Kaopon, P., Lecturer, Loei Rajabhat University, Thailand &amp; Wangkam, R., Lecturer, Loei Rajabhat University, Thailand. Effects of Gelling Agents on Some Characteristics of Sweeten Preserved Tangerine.</li><li>4. Orhun, G.E., Lecturer, Canakkale 18 Mart University, Turkey. Maize Oil for Health Importance.</li><li>5. El-Amir, Y., Lecturer, Assiut U., Egypt. Histopathological Studies on the Effect of Curcumin during N-Nitrosodiethylamine and Carbon Tetrachloride Induced Hepatocarcinogenesis in Rats.</li><li>6. Aynehband, A., Associate Professor, University of Shahid Chamran, Iran. Agro-Environmental Assessment of Nitrogen Dynamic in Wheat Agroecosystem.</li></ol>

#### 16:30-19:30 Urban Walk

#### 20:00-21:00 Dinner

#### Wednesday 20 July 2011

Cruise: Departure at 07:00 Return at 20:30

#### Thursday 21 July 2011

Delphi Visit: Departure at 07:30 Return at 19:30



**Salah M. Abdel-Rahman**

Associate Professor, Genetic Engineering and Biotechnology Research  
Institute, Egypt.

**Shaaban A. Hemeda**

Department of Animal Husbandry, Faculty of Veterinary Medicine,  
Alexandria University, Egypt.

**Mohamed M. Fouda**

Department of Animal Husbandry, Faculty of Veterinary Medicine,  
Mansoura University, Egypt.

**Ahmed I. Ateya**

Department of Animal Husbandry, Faculty of Veterinary Medicine,  
Mansoura University, Egypt.

## **Efficiency of Bovine IGF-I Gene in the Improvement of Milk Productivity Using Marker- Assisted Selection (MAS)**

Because of insulin-like growth factor-I (IGF-I) gene plays an important regulatory function in milk secretion in cattle, IGF1 gene is potential quantitative trait locus and genetic marker (*i.e.*, SNP) associated with milk production trait in cattle. Consequently, marker-assisted selection (MAS) will be useful to increase and accelerate the rate of genetic improvement on milk productivity. In this study, 48 female Holstein cattle reared under Egyptian conditions were selected based on their milk productivity and DNA from blood was extracted to amplify 249-bp of the gene encoding IGF-I. According to the breeding value, PCR products of IGF-I gene (249-bp) were sequenced only in the 15 highest and lowest milk productivity animals (GenBank accession numbers from gb|HQ183710| to gb|HQ183724|, sequentially). The result indicated that two single nucleotide polymorphisms (SNP's) at two different positions were observed in one of the highest milk productivity animals. Where, all 15 animals have adenine (A) and cytosine (C) bases at the positions 33 and 63, respectively, except, one animal (GenBank Acc. No. gb|HQ183711|) has thymine (T) and guanine (G) bases at the same positions (33 and 63, respectively). Thus, this finding can be used as marker-assisted selection (MAS) for high milk productivity in Holstein cattle.

**Mohamed Safwat Abdel-Salam Mahmoud**

Head of Microbial Genetics Department, National Research Centre,  
Egypt.

## **Extension of Rhizobial/plant Host Range and Symbiosis Improvement via Plasmid Transfer**

Leguminous plants gather and use gaseous nitrogen by working symbiotically with special bacteria (rhizobia) in nodules on their roots where each species of Rhizobia nodulate certain plants. In a previous study the *Tn<sub>5</sub> - mob - sac B* system was used to label and transfer plasmids of indigenous *Rhizobium leguminosarum biov. trifolii* to *Agrobacterium tumefaciens*. Among *Agrobacterium tumefaciens* transconjugants, *Agrobacterium tumefaciens* CB and CE strains were characterized to harbor nodulation/bacteriocin plasmids. In the present study, plasmid transfer was attempted by conjugation between *Agrobacterium tumefaciens* CB and CE strains and seven indigenous *Rhizobium leguminosarum* bv. *trifolii* and six *Rhizobium meliloti* strains in order to amplify nodulation gene and/or to increase their plant host-range specificity. Results obtained indicated that all strains tested could receipt CB or CE plasmids from *Agrobacterium tumefaciens*. The transconjugants obtained were characterized by testing them for their abilities to nodulate Egyptian clover plants. All *R. l. bv. trifolii* transconjugants produced more nodules in Egyptian clover roots than their original strains, while all *R. meliloti* transconjugants had acquired the ability to nodulate Egyptian clover as new host plant. Symbiotic efficiency of transconjugants were studied in both Egyptian and sweet clover plants, results showed that most of *R. l. bv. trifolii* transconjugants improved the plant growth parameters and that *R. meliloti* transconjugants had much better symbiotic efficiencies with Egyptian clover.

The obtained modified Rhizobial strains were genetically stable, and their field application will more probably improve plant growth and yield.

**Ardeshir Adeli**

Research Soil Scientist, United States Department of Agriculture,  
Agricultural Research Service, USA.

**J. P. Brooks**

Microbiologist, United States Department of Agriculture, Agricultural  
Research Service, USA.

**J. Jenkins**

Researcher Leader, United States Department of Agriculture,  
Agricultural Research Service, USA.

**Animal and Industrial By-Products Management  
Strategies for Sustainable Agricultural Production  
System and Environmental Quality**

Repeated application of broiler (*Gallus gallus domesticus*) litter to agricultural lands often results in soil P and heavy metal accumulations, which may pose risks to water bodies. We evaluated six different application strategies on P, N and heavy metal losses from an established bermudagrass (*Cynodon dactylon* L.) forages: control (no fertilization), broiler litter alone (N-based), broiler litter plus ammonium nitrate (P-based litter); commercial fertilizer N and P, broiler litter (N-based) plus FGD (flue gas desulfurization) gypsum, commercial fertilizer plus FGD gypsum. Leachate P, N and heavy metals were monitored using lysimeters installed at 60 cm depth. Surface runoff collectors were used to monitor runoff N, P and heavy metals from naturally occurring rainfall events. Bermudagrass were harvested, herbage yield and concentration of N, P and heavy metals were determined. Soil samples were analyzed for Mehlich-3 P, KCl-extractable  $\text{NH}_4\text{-N}$  and  $\text{NO}_3\text{-N}$  concentrations and digested for heavy metal concentrations. Phosphorus-based plus supplemental N and N-based plus FGD gypsum produced forage dry matter yield similar to that of the N-based treatment alone, however, forage P uptake for both P-based plus supplemental N and N-based litter plus FGD gypsum were greater than N-based litter alone, indicating greater P use efficiency with either lower P application or using P immobilizing agent. Application of broiler litter in combination with FGD gypsum suppressed leachate P and resulted in approximately 50% reduction in runoff N, P and heavy metals such as Cu, Zn and arsenic (As) loads than treatments receiving broiler litter alone. Broiler litter applied alone at P-based or in combination with FGD gypsum had lower soil test P levels at in upper soil horizons than litter applied at N-based rate alone. Results demonstrate that combining broiler litter application with FGD gypsum represents an environmentally sound application strategy to

reduce soil P and N accumulation and subsequent risks of nutrient transport.

**Zahra Afrasiabi Navan**  
Associate Professor, Lincoln University, USA.

## **Gold Nanoparticle Based Nanosensor for Accurate Detection of Luteinizing Hormone**

An important determinant to the economics of production success is the genetic quality of the animals. One alternative to owning an expensive male is to artificially inseminate females using semen from genetically superior males. Vasectomized teaser males are often used to determine estrus, but having these males results in the cost for maintaining the animal throughout the year. Also, if the producer is not familiar with the history of the ram, disease can be transmitted to the females anytime. The devices currently available to detect estrus also do not work effectively in sheep and goats in the absence of the male. If a device could be developed to determine the appropriate time to breed in the absence of a male, this would be highly beneficial and could result in increased use of artificial insemination by small farm family operations. One of the most common changes that can be measured in the blood that occurs prior to estrus and ovulation is luteinizing hormone (LH). An LH surge occurs prior to ovulation and sets the time for ovulation. The goal of our project is to develop a device that can quantitatively detect real-time changes in concentrations of LH. There is an absolute need for developing a novel and accurate sensor for detecting LH. In this context, we have designed and developed a highly sensitive assay for detecting low quantities of LH using gold nanoparticles (AuNP) as sensors. Nanotechnology based sensors may possess the potential to identify extremely low concentrations of LH.

**Aydin Akin**

Assistant Professor, Selcuk University, Turkey.

**Ozcan Baris Cital**

Assistant Professor, Selcuk University, Turkey.

## **Determination of Fatty Acid Composition of Plant Leaf Growth Period of *Vitits Vinifera* L. Müşküle Grown in Aladağ Valley in Turkey**

Grapevine leaf samples were taken periodically during the harvest method of gas chromatography fatty acid compositions were investigated. Grapevine leaves were a total of 32 different fatty acids. These fatty acids varied between C 8 and C 24. Most of monounsaturated fatty acids, oleic acid (% 48,82) was found in among them. By the time of harvest was found to be significant differences in vine leaves. While the unsaturated fatty acid was increased, the saturated fatty acid was decreased in *Vitis vinifera* L. (cv. Müşküle grape leaves)

**Monica Alfaro**

Associate Professor, University of Puerto Rico, USA.

**Ana Estrella-Riollano**

Graduate Student, University of Puerto Rico, USA.

## **Ecological Significance of the Asian Clam *Curbicula fluminea*, an Aquatic Invasive Species of Puerto Rico, on the Community Structure in a Tropical Freshwater Reservoir**

This study provides a baseline characterization of the spatial dynamics of *Curbicula fluminea* an aquatic invasive species on the incidence and spatial variability on the benthic macrofauna in a tropical freshwater reservoir in Puerto Rico, and its relations with physical and chemical factors. Such relationships may serve as criteria for evaluation of a water quality restoration initiative in these types of tropical reservoirs. Despite the inferred importance and the dramatically success of colonization of *Curbicula fluminea* since the first report in 1998, with populations densities of 10 m<sup>-2</sup> and practically found today in all the freshwater reservoirs of Puerto Rico, basic information of this clam and its influence on the benthic composition and water quality remain one of the most understudied ecological problems. At three different sampling sites at the Guajataca Reservoir grab samples for nutrients determination, temperature, oxygen, and Secchi disc measurements were taken. Benthic samples were collected in triplicate using a Ekman grab of 225 cm<sup>2</sup>. Positive correlations were found between chlorophyll-*a* concentration and phosphorous, suggesting that phosphate may be regulating phytoplankton at stations with higher light penetration and also regulating the populations of *C. fluminea*. A greater abundance of these organisms were found at sites with higher chlorophyll-*a* (Chl-*a*). Total benthic-macrofauna abundance varied between 6,733 ind m<sup>-2</sup> - 24,112 ind m<sup>-2</sup>, and positive correlation between higher abundance of all organisms with greater contents of sand were significant. Relative abundance of *Curbicula fluminea* represented only 2.31% of the total population, followed by ostracods with 3.26%. Even though relative abundance of the gastropod *Tarebia granifera* accounted for 78% of the whole population, higher densities of *Curbicula fluminea* were found at stations with more oxygen suggesting that this clam can potentially shift native populations and its presence in high densities can compromise the ecological and chemical integrity of these water sources.

**Abas Almodares**

Associate Professor, University of Isfahan, Iran.

**M. Goli**

Graduate Student, University of Isfahan, Iran.

## **Bioethanol Production from Sweet Sorghum under Hot and Dry Climatic Condition**

Fossil forms of biomass, such as petroleum and coal, currently supply the majority of energy needs for society. Several factors influence the increasing interest in the renewable forms of energy. These include, rapid industrialization of nations with higher energy requirement, depleting petroleum resources, high price fluctuation, distribution of oil supply as a consequence of monopoly. Through there are many alternative energy technologies, for transportation, bio-based liquid fuels have been recognized as the best alternative. Currently practices biofuel technologies are based on fermentation of glucose derived from corn starch or sugarcane juice. Due to the controversy of corn with the food and feed supply, a new feedstock material has gained prominence in recent years. Sweet sorghum (*Sorghum bicolor* (L.) Moench as an important energy crop has been considered as an attractive feedstock for the production of fuel bioethanol. It has been identified as having drought tolerance, lower input cost, and higher biomass yield than other energy crops. It is well adapted to sub-tropical and temperate regions of the world, with rapid growth, efficient water utilization. The objective of this study was to select the best row spacing, distance between plants and sweet sorghum cultivars which produce the highest biomass, total sugar and bioethanol under hot and dry climatic condition. Two sweet sorghum (Keller and Sofra) were planted at row spacing of 50, 60 and 70 cm. The distance between plants were 10,15 and 20 cm. plant height, plant diameter, brix, biomass, stalk yield, total sugar, extracted juice and theoretical ethanol production were measured. The result showed that Sofra planted in 50 cm row spacing and 20 cm between rows among the other treatments had the highest biomass (81 t/ha), stalk yield (63 t/ha), extracted juice (15,700 l/ha) and theoretical ethanol yield (5291 l/ha).



**H. V. Anil Kumar**

Associate Professor, DVS College of Arts & Science, India.

**Munirajappa**

Professor, Bangalore University, India.

## **Morphometric Biomass and Nutritive Evaluation of EMS Mutagenised *Morus* Species (Genotype Rfs<sub>135</sub>)**

Mulberry (*Morus species*) is the primary forage for silkworm *Bombyx mori* L. (monophagous) and nearly 70% of the mulberry leaf protein is biosynthesized into silk by silkworm. Mulberry leaf protein is the base for synthesis of two components of silk protein viz sericin and fibroin. Hence mulberry is of great importance to sericulture industry. Mulberry is basically deciduous species of sub-tropical forests with arboreal habit and distributed in a wide area of tropical, sub-tropical, temperate and sub-arctic zones. In India, the cost of mulberry leaf production is reported to be covering nearly 60% of the total expenditure of silkworm cocoon production (Das and Krishnaswami, 1965). Thus the phenomenal increased biomass (leaves) in any mulberry variety becomes the principal determining factor for higher cocoon yield. With this fundamental objective of quantitative and qualitative improvement in biomass to ensure profitable production of cocoon, in the present investigation the rainfed mulberry genotype RFS<sub>135</sub> was chemically mutagenised by Ethyl methane sulphonate (EMS) and evaluated. EMS is a potent mutagen and monofunctional ethylating agent that has been extensively used in genetic research and has been found to be mutagenic in wide variety of genetic test systems from viruses to mammals.

The active bud sprouts of vegetative cuttings of RFS<sub>135</sub> in multiple sets were treated for twelve hours intermittently (every one hour) with three different concentrations (0.1%, 0.3% & 0.5%) of EMS. Further M<sub>1</sub>V<sub>1</sub> and M<sub>1</sub>V<sub>2</sub> generation clones were evaluated for biomass, nutritive and morpho-metric characters. The results revealed that concentrations of 0.1% and 0.3% EMS treatment were effective in significantly altering the morpho-metric characters, biomass yield and phytochemical constituents. The significant variation in the morpho-metric characters such as height of the plant, number of branches, stem girth, number of leaves per plant and increased biomass was recorded among the M<sub>1</sub>V<sub>2</sub> clones of 0.1% EMS treatment (p=0.0001) and of 0.3% EMS treatment (p=0.0006). The biomass indicators such as the leaf area and number of leaves per plant showed significant exponential increase among the M<sub>1</sub>V<sub>2</sub> clones of 0.1% and 0.3% EMS treatments. The mean number of leaves was found to be 872.55 and 989.66 in the variants of RFS<sub>135</sub> mulberry genotype recovered at 0.1% and 0.3% EMS treatment

respectively, as against the control (660.93). Further significant improvement was recorded in nutritive parameters such as proteins, reducing sugars, minerals and moisture content. Moisture retention capacity and Chlorophyll content were also found to be high in 0.1% and 0.3% EMS induced variants.

**Jaime Araya**

Professor, Universidad de Chile, Chile.

**Amanda Huerta**

Professor, Universidad de Chile, Chile.

**Karla Puga**

Forestry Engineer, Universidad de Chile, Chile.

**Carolina Gazmuri**

Ph.D. Student, Universidad de Chile, Chile.

## **Assessment of Damage by Insects and Fungi from *Austrocedrus chilensis* (Cupressaceae) in Central Chile**

The “ciprés de la cordillera”, *Austrocedrus chilensis*, is an endemic conifer of the cold temperate region of the Patagonian Andean forests of Chile and Argentina. It is one of the most important conifers and one with the greatest geographical range, reaching in Chile its northern limit. To ensure effective measures of management for this species it is necessary to first have phytosanitary information, which scarcely exists. This work assesses the main plant health problems of *A. chilensis* at three locations in central Chile, “Sierras de Bellavista” in the “Libertador Bernardo O’Higgins” region, on two mixed forests, one composed by *A. chilensis* and *Nothofagus macrocarpa* and the other by *A. chilensis* and *Pinus radiata* in “San Felipe”, “Valparaíso” region, and “San Gabriel”, in the Metropolitan region on pure stands of *A. chilensis* in the summer of 2011. These places present a particularly vulnerable situation due to the great anthropogenic pressure, to the invasions of exotic species and to the effects of a great magnitude fire. To register symptoms and damages, a form of detection was created especially for natural population of *A. chilensis* which was utilized for sampling 50 trees by forest, according to the sampling lines methodology by conglomerates, with an intensity of 5 every 1,000 trees. The main phytosanitary problems for *A. chilensis* mixed forest in Sierras de Bellavista were defoliation, witches broom and chlorosis, while in San Felipe they are exudation, defoliation and mechanical damage (anthropogenic and non-anthropogenic). The pure forest in San Gabriel had mechanical damage, cankers and witches broom. From this we conclude that the *A. chilensis* forest in San Gabriel is in a better plant health shape than that in San Felipe, followed by the one Sierras de Bellavista.

**Majid Ashouri**

Assistant Professor, Islamic Azad University, Lahijan Branch, Iran.

## **Effects of Nitrogen Fertilizer Levels on Nitrogen Use Efficiency and Yield of Rice under Different Irrigation Regimes**

Four levels of nitrogen (N1=0, N2= 90, N3= 120 and N4= 150 kg ha<sup>-1</sup>) were splited on 4 different irrigation regimes (I1=continuous submergence (CS), I2= 5, I3= 8 and I4= 11 days interval) in a split plot design with 3 replications at the rice research institute of Iran in 2008. Grain yield were 5303, 6628, 7398 and 7418 kg ha<sup>-1</sup> in N1 to N4 respectively, Therefore consumption of 120 and 150 kg ha<sup>-1</sup> nitrogen fertilizer produced same grain yield. Apparent nitrogen recovery efficiency (ANRE) increased and agronomic N use efficiency (ANUE) and physiological N use efficiency (PNUE) decreased significantly with the increment of nitrogen. Grain yield, (ANRE), (PNUE) and (ANUE) were statistically the same under CS and irrigation interval of 5 and 8 days. Grain yield were 7342, 7079, 7159 and 5168 kg/ha in I1 to I4 respectively. (ANRE), (PNUE) and (ANUE) were lowest in 11 days interval. Since obtaining a higher grain yield is important goal in each experiment thus, 8 days Irrigation interval and consumption of 120 kg N ha<sup>-1</sup> purpose for future experiment of rice hybrid in north of Iran.

**Amir Aynehband**

Associate Professor, University of Shahid Chamran, Iran.

## **Agro-Environmental Assessment of Nitrogen Dynamic in Wheat Agroecosystem**

In wheat, improvement of grain yield and yield components and also resource use efficiency has been shown to depend on cultural practices and genotype. The aim of this research was to study the differences in yield and nitrogen use efficiency (NUE) between old and modern wheat cultivars that released from 1978 to 2003 years as affected by nitrogen rates, at the experimental area of the Agricultural Faculty, Shahid Chamran University, Iran, during 2008 and 2009. Our results showed that agronomic characteristics (total dry matter and harvest index), yield components (spike density, grain/spike, and 1000-grain weight), and quality trait (grain protein content) were generally more affected by nitrogen rates rather than cultivars year of release, probably due to limited breeding periods (25 years). Grain yield just affected by N rates, but harvest index neither significantly differed by nitrogen rates nor by genotype. All nitrogen efficiency indices were affected by nitrogen rates and cultivars. NUE and its components (nitrogen uptake efficiency and nitrogen utilization efficiency) were declined with application of nitrogen fertilizer. Although, no significant differences for grain yield were found among cultivars, but they had largely variations in all nitrogen efficiency indices (except for nitrogen harvest efficiency). The most variation was found in nitrogen balance index, nitrogen use efficiency, and Agrophysiological efficiency for different nitrogen rates, respectively. Also, between cultivars, Agrophysiological efficiency, nitrogen physiological efficiency and nitrogen agronomic efficiency had greater variation values, respectively. In general, we concluded that only attention to traditional production criteria (i.e. grain yield) will not satisfactory and must to be seek a new (or other) indicators with more accurate and higher sensitivity analysis range like efficiency indices, especially for nitrogen.

**Mohammad Babadoost**

Professor, University of Illinois at Urbana-Champaign, USA.

## **Phytophthora Blight (*Phytophthora capsici*) of Pepper and its Management**

Phytophthora blight, caused by *Phytophthora capsici*, is one of the most important diseases of peppers worldwide. The pathogen can infect pepper plants at all growth stages, causing seedling death, stem lesion, stem blight, leaf spot, and fruit rot. The first symptom on pepper in the field is commonly crown rot. The affected plants usually die within a few days. In some cultivars, only fruit are infected. Infected fruit develop dark, water-soaked lesions, which are commonly covered with white mycelium of the pathogen. Three approaches were evaluated for management of *Phytophthora* blight in peppers, which included: (i) using resistant cultivars, (ii) induction of resistance in plants by red-light treatment, and (iii) application of fungicides. To identify resistant pepper cultivars to *P. capsici*, more than 80 cultivars/accessions of bell pepper were tested in the greenhouse and field. In the greenhouse, 8-week-old seedlings were inoculated with *P. capsici*. Pepper cultivars that showed resistance to *P. capsici* were also evaluated in naturally infested commercial fields with *P. capsici*. Several cultivars were found resistant/tolerant to *P. capsici*. Pepper seedlings grown under red light (600-700 nm) for four weeks reduced *P. capsici*-infection by 74 percent in the greenhouse. Captan (Maestro 80DF), cyazofamid (Ranman 400SC), dimethomorph (Forum 4.16 SC), famoxadone + cymoxanil (Tanos 50WDG), fluazianum (Omega 500F), mandipropamid (Revus 2.09SC), and mefenoxam (Ridomil Gold Copper 65WP, Ridomil Gold EC 4SC) were effective in controlling *P. capsici* in pepper in the fields. Fungicides should be applied at weekly intervals, beginning with the transplanting of the seedlings. Cultural practices such as using fields with well-drained soils, planting on raised beds, and 3- to 4-year crop rotation with nonhost crops reduces the incidence of *Phytophthora* blight of peppers.

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## **Molecular Evolutionary Analyses of the Genotype I Virus Causing Widespread, Historical African Swine Fever Outbreaks Provides Insights into the Sylvatic Origin and Spread of the Virus**

African swine fever (ASF) is caused by a double-stranded DNA virus of the *Asfivirus* genus, which is endemic to sub-Saharan Africa, where it is maintained in an ancient sylvatic cycle involving wild suids and soft ticks of the genus *Ornithodoros*. This sylvatic cycle occurs throughout East and southern Africa, but not in West Africa, a region to which the virus is believed to have been introduced, relatively recently. The disease, for which there is presently no vaccine, was exported to Europe for the first time in 1957. It caused devastating outbreaks in naïve swine populations in Europe, South America and the Caribbean, following a second introduction in 1960. Over a period of 30 years, ASF has been systematically eradicated from these exotic localities with strict 'stamping out' and other disease control measures, and presently only persists in Sardinia. Past genetic studies revealed that these widespread, historical outbreaks were all due to a genotype I virus that displays remarkable homogeneity across virus protein 72 (VP72). As this genotype also occurs in West Africa, this region is believed to have been the source of the infection. However, the sylvatic origin of the virus that has become established in the West Africa region prior to its export to Europe, and which still persists there to this day, is not known. Using a molecular approach in which we generated and analysed VP72 and 9RL ORF sequence data for ASF viruses from throughout sub-Saharan Africa and those recovered from historical outbreaks in exotic localities, we were able to identify the original source of the infection for the West African region and could trace the subsequent global spread of the virus. Phenetic and cladistic methods of data analysis were employed to infer the independent and concatenated gene phylogenies and revealed the East African region to be the original source of genotype I viruses.

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## ***In Vitro* Culture System for the Production of Artemisinin from *Artemisia Annua* L: An Important Anti-Malarial Plant**

Artemisinin isolated from *Artemisia annua* plants have been proven to be effective for the treatment of both drug resistant malaria and cerebral malaria. However, there was large variation in terms of artemisinin production from *Artemisia annua* plants due to planting location and different environmental conditions. Chemical synthesis of artemisinin has been proven to be difficult and uneconomical for mass production of this compound. *In vitro* cell culture system can hence be the alternative for consistent and sustainable production of artemisinin. Our established cell culture system was found to be effective for efficient production of artemisinin using leaf-derived callus from selected high yielding clone of *Artemisia annua* of Vietnam origin. Two elite clones selected from field grown plants in Vietnam were found to contain 1.2 to 1.5 % artemisinin. *In vitro* selection of cell lines was an important factor for the consistent production of artemisinin. The selected cell lines were categorized into fast, intermediate and slow growing groups based on the growth index of the callus. The cell lines with the consistence growth index were selected to initiate cell suspension culture of *A. annua*. Optimization of culture medium was essential for consistent production of artemisinin. Modified liquid MS and LV media supplemented with 2,4-D and BA enabled the production of high cell biomass. The *A. annua* cells showed a significant increase in cell biomass at the late exponential stage, 15 days after cell culture while the high artemisinin content was detected at the early exponential (9<sup>th</sup> day of culture) and late stationary phase (20<sup>th</sup> day of culture). The addition of GA3 did not stimulate cell growth but increased the production of artemisinin by five folds. A large scale production of *A. annua* cells in a fabricated cell culture tank could be used to mass produce the cells and artemisinin as long as the cells were harvested at the correct culture duration.



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## **Effects of Gelling Agents on Some Characteristics of Sweeten Preserved Tangerine**

This study aimed at reducing tangerine pulp waste after juice extraction by using it as an ingredient for a snack food. Sweetened preserved tangerine was produced by mixing the pulp with sugar, salt, and gelling agent. Three different types of gelling agent (glucose syrup, pectin, and carrageenan), added at three levels, were investigated. Samples of each gelling agent at three different concentrations were subjected to sensory evaluation by 30 panellists, using a 7-point hedonic scale. The data were analysed using randomised complete block design (RCBD) and showed that, among the same gelling agent, samples with 2% glucose syrup, 0.2% pectin, and 0.2% carrageenan, were most preferred ( $p < 0.5$ ). Subsequently, the three samples containing different gelling agents were subjected to sensory analysis. The results showed that panellists preferred the product with 0.2% carrageenan ( $p < 0.5$ ). The finished product had colour values (L, a, b) of  $44.77 \pm 0.07$ ,  $17.80 \pm 0.08$ , and  $54.53 \pm 0.12$ , respectively. The product contained  $15.61 \pm 0.02\%$  moisture,  $0.25 \pm 0.10\%$  fat,  $2.45 \pm 0.04\%$  protein,  $2.43 \pm 0.05\%$  ash, and  $25.42 \pm 0.96\%$  sugar. Microbiological analysis showed that the sweetened preserved tangerine contained  $6 \times 10^3$  cfu/g of total bacteria,  $> 10$  cfu/g of yeast and mould, and no *Escherichia coli*, which met the standards for preserved fruits in Thailand.

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## **Fatty Acid Composition of Three Different Pekmez in Konya, Turkey**

In this study, total fat content and fatty acid composition of three different pekmez (Hesap Ali, Siyah Pekmezlik and Mix Pekmez) in Konya in Turkey were determined by gas chromatography. Monounsaturated fatty acids (MUFA) were found to be higher than saturated (SFA) and polyunsaturated fatty acids (PUFA) in all samples. Palmitic acid was the major SFA (21.07- 25.69% of total fatty acids) in all samples. Oleic acid was identified as the major MUFA (33.58- 37.50% of total fatty acids) in all samples. Linoleic acid (LA) was the most abundant PUFA (13.29-18.24% of total fatty acids) in all samples. It was shown that the fatty acid composition,  $\omega 3/\omega 6$  fatty acids ratio and SFA/PUFA ratio between the pekmez samples were varied.

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## **Studies on New Corn Hybrids for Bioethanol Industries in Hungary**

Nowadays the corn grain is the primary source of bioethanol production in Europe. However, in order to contribute to the sustainable development, extensive research is ongoing to improve the economics of bioethanol production using new corn hybrids.

The agronomic traits and the grain quality parameters of new Hungarian maize hybrids with high carbohydrate accumulation capacity were investigated in field trials and laboratory analyses. Field trials were conducted in four sites of Hungary. Flowering date, yield ability, grain quality parameters (weight, starch, protein and oil content) and suitability for bioethanol production were examined.

The corn starch hydrolysis and alcohol fermentation processes were investigated in a bioreactor of laboratory scale. The grains were grinded and the starch in the corn grain flour was enzymatically hydrolysed in two steps. After liquefaction with alpha-amylase, the mash was saccharificated using glucoamylase enzyme. The fermentation of glucose obtained by hydrolysis into alcohol was carried out by yeasts. The hydrolysis and the fermentation were monitored by detection of glucose and ethanol concentration (HPLC).

The agronomic experiments demonstrated that the new Hungarian corn hybrids from different maturity groups possess high yields even in arid locations and at low doses of fertilization. The physico-chemical analysis of the grains, the corn starch hydrolysis and alcohol fermentation tests confirmed the suitability of the new Hungarian corn hybrid grains as good bioethanol feedstock. The research work was supported by the Hungarian State and the European Union under the TAMOP-4.2.1/B-09/1/KONV-2010-0003 project.

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## **Energy Balancing in Crop Production**

Renewable energy sources coming from agricultural crops play an important role to supply the energy requirement and in terms of environmental effects. Therefore, effective use of energy concerns sustainable agricultural production, economic return, preservation of fossil fuel reserves and reduction of air pollution. Also, emission of the greenhouse gas carbon dioxide to the atmosphere is under discussion in relation to fossil energy use in agriculture. Energy balances represent an essential component of various types of environmental assessments like product eco-balances, product line analyses, eco-audits or engineering sequence estimates. Differences in scale, method and goals, often result in differences among studies. The most appropriate method applied to crop production is the process analysis where fossil energy input is considered rather than manpower or solar energy. Consequently, although sunlight is the primary energetic input, energy balance sheets in agriculture are mainly dominated by fossil energy input (support energy) which is strongly dependent on production intensity. Fossil energy input is split to direct and indirect input components. Direct energy input includes the consumption of diesel fuel required for field operations taking into account the influences of location and management conditions. Moreover, energy consumption for construction of agricultural machines is also considered as direct energy input. Indirect energy inputs include seed material, plant protection agents, fertilizers and operation of machines. Production and utilisation of nitrogen (N) fertilizer represents the largest component of energy consumption in agricultural systems. Mineral fertilizers account for 40 – 55 % of the total energy used in crop production in developed countries. Thus, differences in management practices such as previous crop (e.g. legumes) or alternative fertilizer management have significant effects on total energy input and energy efficiency in crop production. Our results show that different N management strategies affect the energy balance of crops. For example, averaged across 6 years the input energy varied from 7.4 to 16 GJ ha<sup>-1</sup>. In maximum, energy output increased to 260 GJ ha<sup>-1</sup> when winter oilseed rape received 240 kg N ha<sup>-1</sup> and followed the pea crop in crop rotation.

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## **Histopathological Studies on the Effect of Curcumin during N-Nitrosodiethylamine and Carbon Tetrachloride Induced Hepatocarcinogenesis in Rats**

This experiment was performed to evaluate the protective effect of curcumin on N-nitrosodiethylamine (NDEA) and carbon tetrachloride induced hepatocarcinogenesis. Forty male rats were divided into four groups. In group A, fifteen rats were received a single i.p. injection of NDEA (200 mg/ kg body weight). After one week, rats were received weekly s.c. injections of carbon tetrachloride (3 ml/ kg body weight /week) for 6 weeks. In group B, fifteen rats were received diet containing 0.2% curcumin two weeks before the injection of NDEA and carbon tetrachloride and continued throughout the experimental period (20 weeks). In group D, five rats were received diet containing 0.2% curcumin for the whole period of the experiment. In group E, five rats served as control. Specimens from liver were taken for histopathological examination. The results of this experiment suggest that curcumin exerts a protective effect against N-nitrosodiethylamine and carbon tetrachloride induced hepatocarcinogenesis.

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## **Winter Wheat Yields Decline with Spring Higher Night Temperature by Controlled Experiments**

The trends of daily maximum & minimum temperature in global warming indicated that the daily minimum temperature (Tmin) has risen more than twice as fast as the daily maximum temperature (Tmax) over 20th Century. Considering the asymmetric trends of the Tmin and Tmax, and global warming is mainly characterized by the higher night air temperature and smaller daily range. Most researches have mainly focused on how the crops response to daily mean temperature, while few controlled experiments were carried out to investigate how the crops response to the Tmin rise. Especially, no researches were reported on how crops response to the higher night temperature, which was the mainly trends of the climate warming. Taking winter wheat as the test crop, this study aimed to investigate how the winter wheat growth and yields response to the spring higher night temperature.. In the field experiments, infrared heaters were used to increase spring Higher

Night Temperature (HNT) by 2.5°C in contrast to the normal night

temperature (CK) in the spring of 2008. The results indicated that, compared to the CK treatment, growth duration of the winter wheat was shortened, phenological dates were earlier and yields were significantly reduced under the HNT treatment. Specifically, the milking date was four days earlier, mature date was five days earlier, others phenological dates were one-two days earlier than those under the CK, and the milking process under the HNT was shorter by 2 days. The winter wheat yields in the HNT treatments were reduced by 26.6%.The important reasons for yield decline include the shorter growth duration and the milking processe as well as the earlier phenological dates. As the growth duration became shorter, the yield compositions under the HNT changed. The significant decrease of effective panicles and kernels per panicle were the main reasons for the wheat yield decline under the HNT. At the same time, soil moisture decrease from the increased evapotranspiration under the HNT would also contribute to the yield decline. As expected, the adaptation

measures should be considered to cope with the impacts of global warming on crops, and further researches and assessments should be conducted.

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## **The Agricultural Productive Cooperatives in Poland**

The individual agricultural farms are in Polish agriculture the predominant form of property. This does not signify, however, that only these subjects have an influence on its competitiveness and profitability. Except farmers' independent farms, there are also private companies, state- or council-owned farms and as well as cooperative farms on the agri-food market. Especially the latter constitute interesting, but still underestimated in Polish conditions form of agribusiness.

The agricultural cooperatives exist in all countries, in which the agriculture functions in conditions of market economy, independently from the degree of development of the country and its location. Agricultural productive cooperatives (APC) play an essential role in cooperative farming. The aim of the article is to show the essence of agricultural productive cooperatives' activity and their role in the farmers' and local communities' protection.

The description of the history of agricultural productive cooperativeness in Poland contained in the study explains the causes of foundation and liquidating of APC, mainly because of the changing political and economic climate in the country. In Poland there are 1108 registered agricultural productive cooperatives at present, but about 829 of them conduct economic activity. Since the nineties of the XX century, the number of these subjects falls with the average of 10 annually in the last few years. Fundamentally, the main part of their activity is the floral and animal production, but many of them undertake also the non-agricultural activity to improve farming results. The article presents various business activities which APC get involved in at present in order to meet the increasing requirements of the market. Moreover, the study specifies the role of APC especially in the local environment and it shows the advantages of cooperative farming in agriculture. At the end of the article there is the summary of the undertaken considerations and conclusions.

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## **Nitrogen Fertilization and Chemical Fungal Disease Control in No-Till Wheat**

The intensive use of Nitrogen (N) fertilizers to maximize yields increase susceptibility of wheat (*Triticum aestivum* L.) cultivars to some fungi attack (*Puccinia triticina*). The interaction between N response and fungal diseases is documented for conventionally tilled wheat in Uruguay. Under no-till the quantity of crop residues on the soil surface may increase the severity of several plant pathogens attack. High input agriculture give the highest grain yields however Uruguayan growers often question the increase in cost production. Knowledge on N response and fungal disease control will facilitate decision making leading to increase input efficiency and crop profitability. Field experiments were conducted in INIA-La Estanzuela (Uruguay) during 2006-2007 to evaluate the interaction between N fertilization and fungal disease chemical control in high yielding wheat varieties. A factorial combination of N doses, protection strategies and genotypes was used. Protection treatments consisting in: 1) unprotected crop, 2) total protection through out the growing season with epoxiconazol + pyraclostrobin, 50+133 g/l every three weeks starting at Zadok 3.0 and metconazol, 90 g/l at beginning of flowering, 3) strategic fungicide applications based on disease infection and weather condition. High N fertilization rates produced larger grain yield in 2006 compared to 2007, where water deficit at flowering reduced grain yield and fertilization efficiency of N doses applied at Zadok 3.1. The effect of fungicides increased with increasing N levels thus maximum yields were achieved with the highest N rate and total protection, however it was not always statistically significant. On the other hand, with moderate N rates yield difference between strategic and total protection where commonly not significant. Yield increase due to fungicide application was associated with larger grain weight per ear as a consequence of heavier 1000-kernel weight and also greater number of kernel per meter square with early rust infection. Total protection of susceptible varieties was economical with high N levels in those cases and grain quality (protein %) was improved.



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## **Only Extreme Vole Densities Limit the Establishment of Long-Lived Plants in Riparian Field Margins**

The strength of top-down effects of herbivores on plants may be controlled by the mechanisms that regulate herbivore numbers. Further, the stability of herbivore numbers may affect their long-term impact on plants. In this study, we tested the importance of variance in herbivore pressure to the strength of top-down limitation in plants in grassy field margins. Seedlings of six tree species were exposed to relatively stable and variable densities of enclosed *Microtus* voles. The study sites represented differences in carrying capacities, as indicated by the major differences in the height of vole peaks. Based on the threshold herbivory hypothesis we predicted that 1) the height of herbivore peaks (maximum density) affects the establishment of long-lived plants more than cumulative herbivory at lower herbivore numbers (mean density) and 2) variable vole density would negate the establishment of all plant species, whereas the relatively stable vole density would limit the establishment of only most palatable species. Furthermore, we investigated whether the herbivory effect is better explained by the absolute density of voles or the density relative to the carrying capacity. As predicted, sapling survival was significantly higher in the stable than in the variable vole density enclosures. The maximum vole densities explained the negative herbivory effect better than the mean densities. Our results were only partly in accordance with the threshold herbivory hypothesis, as herbivory in the stable density enclosures was not limited to the most palatable species. The herbivory effect was better explained by the absolute densities than the densities adjusted to the carrying capacity, indicating that the herbivore density was more crucial to the fate of the saplings than the amount of grassy vegetation around the saplings. Sparser vegetation i.e. lower carrying capacity had an indirect positive effect on the sapling survival as vole peaks remained lower. We conclude that if vole densities are

kept at relatively low numbers e.g. by restricting the carrying capacity of the vegetation, tree saplings may have good establishment opportunities in riparian field margins.

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**Virus Free Grape Plants Display Different Enzyme Profiles and Graft Compatibility Ratios with Rootstocks**

Virus free plants of grapevine (*Vitis vinifera* L.) cultivars (Bozcaada Cavusu 110 and 161, Emir, Narince P1/4 and 11, Yapıncak, Round seedless, and Razakı 11/4) were tested for esterase and peroxidase enzymes using PAGE and their graft compatibility with the regular rootstocks (SO4, 1613C, 41B, 44-53 EM, 420A, 5C, 99R, 110R, 140Ru, 1103P, 5BB, and 8B) were determined. Compatibility was attained according to the common bands shared both by the rootstocks and scions. Results showed that compatibility ratios ranged between 20-57% in peroxidase and 0-86% in esterase. The most compatible combination was between Narince plants and 1103P in peroxidase, and between Round seedless and the stocks, 99R, 5C, SO4, and 420A in the esterase. Yapıncak showed no compatibility at all with the rootstock 44-53 EM in the esterase.

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## **Shell Power: Managing the Giant Earthworms (*Pheretima Elongata*) with *Melanoides Granifera* to Save the Ifugao Rice Terraces (IRT)**

The Ifugao Rice Terraces (IRT), Philippines were among the World Heritage Sites in 1995 by UNESCO. However the terraces are now in degradation. Among the prime reasons of deterioration is the giant earthworm (*Pheretima elongata*) that has destroyed the rice terraces causing low rice production, low income and erosion. This study aims to test the effectiveness of *Melanoides granifera* shell lime in managing the giant earthworms of the rice terraces.

Field evaluation and pilot testing were applied in the study. The two-factor - factorial within a Randomized Complete Block Design (RCBD) was used. The dosages of the mixture of shell lime and the municipalities were the two factors considered. Seven dosages were tried in four municipalities. There were 28 treatment combinations performed in three blocks, each with an area of 1m x 2m of the rice field. The data were treated using Analysis of Variance and the Duncan Multiple Range Test (DMRT). Interview and focus group discussion were used to collect data from the farmer responses for the pilot testing.

Mixtures of 50g shell lime: 6L water and 100g shell lime:6L water were found to be very effective when applied on field. The giant earthworms died at an average time of 6 minutes and 6.42 minutes respectively. The application increased the soil pH making the soil more productive. Results of the pilot testing of the shell lime mixture confirmed the effectiveness of shell lime in controlling *P. elongata*. The farmers recommend the use of shell lime on field using the desired dosage. The discovery of this shell lime mixture is a solution towards the control of the devastating giant earthworms.

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## **How Does the Proximity of a Field Plot Affect Land-Use Choices? Using Stated Preference Data to Examine Landowners' Preferences**

Agricultural land in Finland is going through structural changes. Landowners who give up farming by 3% on annual base typically are not willing to sell their land. The ownership development and the pressure to intensify farming have gradually shifted land cultivation from landowners to tenants. Based on earlier studies land consolidation might be successful in improving economical efficiency of Finnish farms by increasing the field plot size and more importantly affect land-use choices. Together with field plot size increase, land consolidation affects also the distance between the farm compound and the field plots. Economical effects from these adjustments are typically calculated by travel cost methods. However, landowners' perspective regarding preferences for land use is ignored or partly overlapped by predictions made by researchers.

Based on applied econometric models fitted to stated preference data, we revealed that the proximity of a field plot is a relevant factor affecting land-use decisions. One-fourth of landowners would change the use of a field plot if the condition of distance was changed. Landowners would continue farming a field plot if its distance from the farm compound was reduced, being willing to accept on average €79.60 less in net income per ha per year. The effect of a greater proximity of field plots to the farm compound following land consolidation was heterogeneous, particularly depending on the farm size and its location.

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## **Diagnosis and Population Dynamics of Nematodes in Two Pineapple Crop Systems in Costa Rica**

We determined the presence of gender, population density and population dynamics of nematodes in pineapple (*Ananas comosus*) (L. Merr, in two cropping systems in Costa Rica, for the years 2006-2008.

The study included a diagnosis at the level of soil and plant root of two to twelve months to allow the determination of the population dynamics of nematodes in the different batches; during the time period specified in systems conventional and organic crops in two regions from Costa Rica, like North Huetar and Atántic Huetar. For this studies we selected commercial lots, which were sampled once a month during February to December in the years 2006-2008. In each of the samples, were proceeded to the characterization and quantification of the genera found.

The diagnosis, made allows the identification of seven genera at ground level: *Helicotylenchus* spp, *Meloidogyne* spp , *Pratylenchus* spp, *Tylenchus* spp , *Tylenchorhynchus* spp, and free-living nematodes; the genus *Helicotylenchus* spp was the most frequently identified. The largest population of plant parasitic nematodes is observed at ground level corresponds to the genera *Pratylenchus* spp and *Helicotylenchus* spp.

The most frequently observed nematodes in roots of pineapple plants under organic techniques were: *Criconemella* spp., *Helicotylenchus* spp., *Pratylenchus* spp; in soil were presented *Helicotylenchus* spp., and *Pratylenchus* spp., with frequencies of 100%. In plant roots and soil under conventional techniques pineapple gender *Helicotylenchus* spp. was the most frequent. The genus *Pratylenchus*

spp. had the highest average population density of root organic and conventional plants (ind/100 1009.83 and 1075.22 g of root).

In the organic management overhead had a higher diversity of nematodes in the roots of pineapple plants, among these nine genera parasitic: (*Pratylenchus* spp., *Helicotylenchus* spp., *Meloidogyne* spp., *Nacobus* spp., *Haplolaimus* spp., *Tylenchus* spp., *Criconemella* spp. y *Xiphinema* spp.) and free living nematodes, compared with root samples of plants with conventional management were presented six genera parasitic: (*Pratylenchus* spp., *Helicotylenchus* spp., *Nacobus* spp., *Tylenchus* spp., *Meloidogyne* spp., *Criconemella* spp.) , and free living nematodes.

At root, the nematodes identified were five: *Helicotylenchus* spp, *Meloidogyne*, *Pratylenchus* spp, *Rotylenchus* and free living nematodes. The largest population of plant parasitic nematodes at the root level observed corresponds to the genera *Helicotylenchus* and *Pratylenchus* spp.

In soil grown pineapple plants with conventional management presented a seven parasitic genera like: (*Pratylenchus* spa., *Helicotylenchus* spa. ,*Tylenchus* spa., *Meloidogyne* spa., *Criconemella* spa, *Haplolaimus* spp. y *Tylenchorhynchus* spp.) and free living nematodes. While the soil of plants grown under organic management presented six genera parasitic as: (*Pratylenchus* spp., *Helicotylenchus* spp., *Tylenchus* spp., *Meloidogyne* spp., *Criconemella* spp. y *Rotylenchus* spp.) and free living nematodes.

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## **Implications for Crop Production at a Semi-arid Ecotope in the Limpopo Basin in South Africa**

Rain-fed agriculture is critical to food security in the semi-arid regions of South Africa. Spatial and temporal variability in annual rainfall in a dry land area such as represented by the semi-arid ecotope in the Limpopo Basin (South Africa) imposes several challenges for crop growers. Based on our study using twenty three years (1983-2005) of rainfall data at an ecotope at the University of Venda, we proposed the use of drought tolerant crop technologies which include specific legumes and small-grain cereals such as finger millet, pearl millet and sorghum. The legumes adapted to the dry land ecotope include chickpea, cowpea, pigeonpea and tapery bean. Apart from rotation with cereals, these legumes improve soil fertility through biological nitrogen fixation, provide food for human consumption and generate income for farmers. We evaluated a typical drought tolerant legume, pigeonpea, for two seasons for both adaptation and yield potential at the ecotope under rainfed conditions. More than 60% of the twenty genotypes that were included in the experiment flowered and matured within the cropping season indicating their adaptation to the area. At least five of the cultivars obtained grain yield >1.5 t/ha over the two year period. The highest yield (1.7 t/ha) attained by genotype P 1167/11 was >10-fold that obtained by the check cultivar. This indicated the potential of the crop under the semi-arid conditions and a new option for legume farmers in the agro-ecological zone represented by the ecotope.

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## **Histopathological Effects of 2,4-Dichlorophenoxyacetic Acid on Sprague-Dawley Rats with a Special Reference to its Possible Carcinogenicity**

This study investigated the toxic effects of 2,4-dichlorophenoxyacetic acid (2,4-D) on male Sprague-Dawley rats. In which, 30 rats were divided into three groups (10 rats each): control group received orally normal saline (3 ml/kg b.w.), 2 months-treated group received orally 2,4-D (30 mg/kg b.w.) for 2 months and 6 months-treated group received (30 mg/kg b.w.) for 6 months. At the end of each treatment, specimens from liver, kidneys, lungs, testicles, epididymis and brain were obtained and subjected for histopathological examination. After 2 months, the overall changes were milder and ranged from vascular to necrobiotic findings. On the other hand, changes seen after 6 months were severe particularly in the liver and kidneys. In the liver, there were focal areas of necrosis and preneoplastic changes in the form eosinophilic preneoplastic foci, oval cell proliferation and spongiotic pericytoma. Kidneys showed glomerular swelling, thickening of the glomerular basement membrane and hyperplasia of the renal tubular epithelium. Lesions in the other organs included necrosis and sloughing of bronchiolar epithelial lining and mononuclear cellular infiltration in the lungs, necrosis of seminiferous tubular epithelium in the testicles and neuronal degeneration in the brain. In conclusion, 2,4-D induced deleterious pathological effects on vital organs including preneoplastic changes in the liver.



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## **How Overstory Cover and Thinning Impacts Understory Vegetation in a Riparian Forest in Nebraska, USA**

Removing invasive woody species has been used to restore riparian forests and reduce vegetative evapotranspiration. However, simply removing unwanted species does not ensure a positive outcome. Without planting native species after thinning the disturbance can assist the spread of invasive understory species rather than restoring native species. Vegetation surveys were conducted along transects in 2008 and 2010 to assess how understory species composition responded to removing invading *Juniperus virginiana* and *Elaeagnus angustifolia* from the native riparian forest dominated by cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*) and rough-leaved dogwood (*Cornus drummondii*) and how it varied with distance from the edge of the terrace of the Republican River near Bartley, Nebraska, USA. A total of 55 species were observed and grouped into overstory and understory categories for analysis. Frequency of warm season grasses (e.g. *Panicum virgatum* and *Spartina pectinata*), invasive grasses (e.g. *Phalaris arundinacea*) and invasive forbs (e.g. *Cirsium vulgare*) increased in thinned plots while grass-like species (*Carex* and *Cyperus*) and brome (*Bromus inermis*) were more frequent in control plots. Both brome and warm season grasses were more frequent on the edge by the terrace and away from canopy trees. In contrast, grass-like species frequency increased with distance from the river and under trees. Ordination results indicate that vegetation at the edge of the terrace was different than vegetation deeper within the forest. In contrast, vegetation 20-38 m from the edge was not distinct from that 40-60 m from the terrace edge. Between 2008 and 2010 brome and, to a lesser extent, native woody seedlings and lianas became more frequent in thinned plots at the expense of invasive forbs. In contrast, invasive woody seedlings were

more frequently observed in control plots in 2010 than in 2008 suggesting further spread of invasive tree species at this site without removing invasive trees.

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**Insecticidal Effect from *Schinus molle* Leaves  
Extracts on *Xanthogaleruca luteola* Larvae  
(Coleoptera: Chrysomelidae)**

Elm leaf beetle, *Xanthogaleruca luteola* Müller (Coleoptera: Chrysomelidae), is an insect defoliator of elms (*Ulmus* spp., Ulmaceae), that are greatly damaging urban trees in several regions of central Chile. The insecticidal effect of ethanol and water extracts from new and mature leaves of *Schinus molle* L. (Anacardiaceae) was evaluated on *X. luteola* third instars' larvae. The extracts were prepared with the dust obtained from the leaves dried in a forced air stove. The ethanol and water extracts were evaluated at concentrations of 0.5 to 4.3% w/v from new leaves; and 0.7 to 5.9, and 0.5 to 4.3% w/v for mature leaves, respectively. The extracts were applied to fresh elm leaves and the insects were fed. The extracts were efficacious against the *X. luteola* larvae, particularly those prepared with new leaves. The ethanol extracts caused greater mortality than the water ones, and both produced better results as concentration increased. Average mortalities of 89 and 67%, and 78 and 63% were obtained with the maximum concentrations of ethanol and water extracts from new and mature leaves, respectively. The lower concentration to kill 50% of the population (1.28% w/v) was obtained at the seventh day of evaluation with the ethanol extract from new leaves. The emergence percentage of *X. luteola* adults from the surviving larvae from extracts treatments was evaluated. These insects presented molting problems and wing deformities in all the concentrations evaluated, with a greater intensity as concentration increased, up to 100% in the bioassays with the ethanol extract from new leaves. It was concluded that the extracts from *S. molle* leaves contains substances toxic and regulating growth and development on *X. luteola* larvae, which may have a potential use as a bioinsecticide in Integrated Pest Management plans in urban trees, to decrease the risk of using conventional pesticides in public areas.

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**Mexican Cactaceae and the Risks They are Facing**

The Cactaceae family, which originated in the Americas, comprises close to 2000 species which have adapted to desert climates. Mexico has the greatest richness of these plants, with 913 taxa, 80% of which are endemic to the country. The Sonora and Chihuahua Deserts, the low deciduous forest and the Balsas River Basin are desert and semidesert regions with a high diversity of cacti. Among the regions with the greatest cactus diversity in Mexico, The Tehuacán-Cuicatlán Valley and the Metztitlán Canyon stand out. That said, an alarming number of Mexican cactus species are currently listed in some category with a risk of extinction. The Official Mexican Standard (NOM-059-ECOL-2001) lists 255 taxa, the International Union for Conservation of Nature's Red List (IUCN) includes 65 taxa and the Convention on International Trade in Endangered Species (CITES) lists 41 (Appendix I); the other Cactaceae are listed in Appendix II. The main causes of this risk of extinction are: changes in land use, the introduction of exotic species and the illegal collection of specimens. Cacti are important structural elements and play a key role in the community dynamics of semideserts. Their disappearance leads to a process of biological impoverishment and the loss of resources that are useful to people. Considering the risk to which at least 30% of the Mexican cactus species are currently exposed, protection measures are urgently needed. Suggested measures include the collection and preservation of seeds, growing the cacti in greenhouses for research purposes, re-introducing the species into their natural habitats and the promotion of their legal sale. It has also been suggested that areas of exclusion be set up to prevent both the damage done by livestock and the removal of the plants from their natural environment by people. In addition, training in environmental education is needed to help the local population formulate strategies for the multiple and sustainable uses of their resources.

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## **Kentucky Bluegrass (*Poa pratensis* L.) Germplasm for Seed Production without Field Burning**

Removal of post-harvest residue with open-field burning, which maintains grass seed yield and stand longevity, has been eliminated in Washington and is restricted in Oregon and Idaho, USA. The study objective was to develop Kentucky bluegrass (*Poa pratensis* L.) cultivars that have sustainable seed yield without post-harvest field burning and still maintain acceptable turfgrass quality. The study consisted of eight PI accessions and two check cultivars ('Kenblue' and 'Midnight'). Accessions were previously selected for both seed yield without field burning and turfgrass quality. In a space-plant nursery at Pullman, WA, several agronomic yield parameters were evaluated over a 2-year period and individual plants were re-selected within each accession or check with the highest seed weight, highest seeds per panicle, highest panicle number per unit area, and highest seed yield. These, plus seed from the original population, were planted in a seed increase nursery at Central Ferry, WA. The nursery was harvested in June 2006 and 2007 and seed was planted in turfgrass plots in 2006 and irrigated and non-irrigated seed production plots in 2007 at Pullman, WA. The turfgrass trial was evaluated monthly from 2007 to 2010 according to National Turfgrass Evaluation Program protocol for turfgrass quality. Seed production plots were harvested in 2008, 2009, and 2010. Selection for seed yield components had a variable response and yield was more dependent on accession. Accession PI 368241 showed promise of being able to provide excellent seed yield under both irrigated and non-irrigated non-burn management over multiple years while maintaining good turfgrass quality.

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## **Analysis of Community Based Rural Development Project Implemented by LEADER Program: Case Study in North Tipperary Region, Ireland**

Community based rural development has become an important aspect of overall growth plans in and across Europe. Within Ireland the need for sustainable rural development can clearly be seen because of its long agrarian history and also impart because of its recent history of fast-paced urbanisation. This paper will discuss the impacts of the current LEADER initiative in the North Tipperary region of Ireland as part of the larger Rural Development programme set forth in the Common Agricultural Practices of the European Union.

The effects these rural development programmes have within a region can be varied and include: social, economic and environmental impacts. During the research there have been used several methods for calculating the impacts of a development programmes within a given area. The type of impact and the causes will determine the methodology used within a given scenario. Accurately measuring a programme's impact allows development practitioners and researches alike the ability to represent the complex issues of rural development in succinct and quantifiable ways.

The research shows that community members and other community knowledge bases can be a valuable asset in creating a rural development programme. This research paper will attempt to use that same asset in order to evaluate the rural development programme in North Tipperary. By meeting with and conducting surveys with community members the community knowledge bases can be tapped in order to assess the programmes that they themselves are a part of. The results of the research on this paper also gives detailed information on how local partnerships such as LEADER and the County Enterprises Board impact the rural community that they serve. This research work will seek to utilize all of the knowledge gathered in order to create representative report on the impacts of the LEADER initiative programmes operating in North Tipperary.

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## **Economic Thresholds of *Bifora Radians* Bieb. and *Centaurea Depressa* Bieb. in Winter Wheat Fields**

Wheat is a main winter-sown arable crop in Turkey. *Bifora radians* Bieb. (Bifra) and *Centaurea depressa* Bieb. (Dark Blue Bottle) are annual noxious broadleaf weeds in wheat fields in the Central Anatolian Region of Turkey. In this study, the economic threshold levels of *Bifora radians* and *Centaurea depressa* widely found in wheat fields were determined depending on competition between wheat plants and different densities of the weeds. Experiment was conducted in the year of 2006 and 2007 in four different wheat fields which were selected to be a representative for Central Anatolian Region. The trials were established on the arid field conditions where the wheat variety "Karahan 99" was planted. The study was carried out according to randomized plots trial pattern with 4 replications and the plots were 1 m<sup>2</sup> in size. The control and different number of *Bifora radians* and *Centaurea depressa* weedy plots were arranged at seven different density as 1, 3, 5, 7, 10, 15 and 25 plant/m<sup>2</sup> after wheat emergence in the experiments. All weeds were marked and all the other weed varieties were removed from the plots at every each 10 days interval until harvest. After threshing process, linear regression was correlated among % yield losses obtained from weedy plots and yields from the control plots. Accordingly economic threshold levels of bifra and dark blue bottle were found 1.5-2.2 plant/m<sup>2</sup> and 1.8-2.7 plant/ m<sup>2</sup> respectively, in arid areas depending on using different herbicides. Different values of economic threshold of the same species are due to cost of herbicides applications. Economic thresholds of both weeds were determined as very low. These results indicated that *Bifora radians* and *Centaurea depressa* should be controlled in wheat fields.

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## **Studying the Possibility of Using the NDVI Index to Analyze and Monitor Droughts in Esfahan Province, Iran**

In order to define a surrogate index for the climatic indices in analyzing and monitoring droughts, the climatic index of SPI was computed from monthly rainfall data of 36 stations spread over Esfahan province during the 1997- 2003 period. The index was computed only during growth season months of March to September. The Normalized Difference Vegetation Index (NDVI) was extracted from NOAA images during the study period and used as a surrogate index. Their spatial resolution was 1.1 kilometers.

The results showed that both indices were high during spring months of March to May and decreased during the summer warm months. Both of the indices showed similar behavior over the rich range lands but were somewhat irregular over the medium and poor range lands. The correlation between the indices was significant and high over all the stations and the province as a whole. These correlations substantiated the use of the NDVI index in place of SPI in analyzing and monitoring droughts in Esfahan Provinces and other places, especially where the climatic data are rare and sparse.



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## **Effects of Intravenous Choline Treatment on Acute Phase Proteins and Cardiac Function in Dogs with Endotoxemia**

Endotoxemia is one of the most important clinical problem and of high mortality rate in human and veterinary medicine. To be reduced mortality rate, researches are focused on the new treatment strategy , e.g. anti-inflammatory cholinergic system activation via choline product.

The main objective of the present study was to determine the effects of choline or cytidine-5'-diphosphocholine (CDP-choline) on endotoxin-induced activation of acute phase response and cardiac dysfunction. Dogs were treated intravenously (i.v.) with saline, choline (20 mg/kg), or CDP-choline (70 mg/kg) once, 1 min after i.v. injection of endotoxin (0.02 mg/kg).

Endotoxin-induced marked leucopenia and hemaconcentration. Increased C-reactive protein (CRP), haptoglobin, and ceruloplasmin as well as decreased albumin levels in response to endotoxin were attenuated or blocked by choline or CDP-choline. Choline or CDP-choline blocked endotoxin-induced reduction in fractional shortening and ejection fraction.

These data show that choline administration, as choline chloride or CDP-choline, restores the acute phase response and prevents the development of cardiac dysfunction during experimental endotoxemia in dogs probably by increasing both neuronal and non-neuronal cholinergic activity.

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## **A Woman's Point of View on Goat Production**

Small ruminant production in Turkey is carried out in small farms to meet their supply. In this situation, family labours are used to meet of animal's need; woman, children and also man are worked for the production. Women play an important role in small ruminant production; because they spent more time for feeding, milking, cleaning and care for animals, as well as the administration of medicines. Several women goat breeders are able to make cheese and also marketing of cheese.

There are several reports about animal and human relationship. Women are more sensitive than men. For that reason, their relationship with animals can be determined as more emotional than men.

It is expected that women establish stronger relation with animal and this affects the sustainable goat farming in developing countries. Sustainable goat production is possible if the production carried out under the economical, social and ecological conditions.

In this work, a survey study was used with woman goat breeders. The aim of this study was to introduce women viewpoint on goat production, their suggestions to improve the production and also to mark their time for goat production. Otherwise, trends of goat breeders about animal welfare could be measured from the results of this study.

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## **Using Constructed Wetlands to Treat Agricultural Wastewater**

An innovative research program was initiated in 1999 at the Nova Scotia Agricultural College's Bio-Environmental Center in Nova Scotia, Canada with the overall goal of assessing constructed wetlands as an agricultural wastewater treatment option in a cold region such as Atlantic Canada. Research has focused on: i) assessing year-round treatment capabilities, ii) developing and improving design criteria specific to Atlantic Canada, and iii) identifying simple management practices to improve treatment. This paper will outline some of the research activities and results obtained since the inception of the program. These include: (i) over-winter performance, (ii) year-round performance, (iii) hydraulic retention time estimates, (iv) mechanical aeration, (v) seasonal vs continuous loading, (vi) rate constant estimates, (vii) performance of a wetland-reservoir wastewater treatment and reuse system, and (viii) assessment of the year-round viability of a constructed wetland treating abattoir wastewater. Overall wetland performance will be presented.

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## **Zn Efficiency in Two Wheat Cultivars in Soil Amended With Organic and Inorganic Amended Soil**

Organic matter amended soil can improve many physical properties of agricultural soils. If the quality of the amended is not controlled, its application can also result in excessive concentrations of trace metals such as Zn (zinc). However, metal salt added by organic sources are less phyto-available than inorganic Zn sources. The objective of this research was to investigate Zn efficiency of two wheat cultivars (cv. Bakcross and Alvand) in a soil amend with organic and inorganic Zn sources. Treatments were consist of applying 25, 50 and 100 t ha<sup>-1</sup> Zn enriched cow manure (800 mg Zn kg<sup>-1</sup>) and control soil. To compare the effects of organic and inorganic sources, similar rates of Zn as ZnSO<sub>4</sub> were also applied. After harvesting plants, the shoot and root Zn concentration were determined using atomic absorption spectrophotometry. At the different rate application of organic and inorganic Zn sources, Alvand relative to Bakcross cultivar showed the greater root Zn concentration. Although both cultivars showed the greater root Zn concentration in inorganic relative to organic amended soil. In addition, at the same loading rate, the DTPA-extractable Zn in the soils treated with cow manure was significantly less than the ZnSO<sub>4</sub> treated soil, especially for the greatest loading rate of organic amendments. Greater decreases of soil DTPA-extractable Zn at the greatest loading rate of organic amendment can be concluded that land application of cow manure increased the adsorption capacity of the soil and thus, decreased the soil DTPA-extractable Zn. However, increasing the loading rate of Zn from both organic and inorganic sources significantly increased the soil DTPA-extractable Zn. The results of this experiment point to the fact that the source and the loading rate of Zn are important factors in determining Zn phytoavailability.

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## **Effect of Common Mallow (*Mava spp*) Competitiveness on Grain Yield and Yield Components in Wheat under Different Levels of Nitrogen**

In order to study the effect of mallow weed competition and nitrogen (N) rates on grain yield and yield components of wheat cv. Atila5, a field experiment was conducted in 2009. The experiment was designed as a split-plot with three replications and additive series. The N application rates were assigned in the main-plots (50, 100, 150 and 200 kg.N.ha<sup>-1</sup>) and sub-plots consisted of target common mallow (*Mava spp*) densities (0, 5, 10, 15 and 20 plant.m<sup>-2</sup>). Result indicated that, the effect of nitrogen (N) treatments, weed density (WD) and N×WD on grain yield (GY) was significant in 1% probability level. Grain yield decreased significantly as the WD increased. Grain yield reduction in high weed densities was due to lower spike per m-square (Sm<sup>-2</sup>), grain per spike (GN) and 1000-grain weight. Under a density of 20 mallow plant.m<sup>-2</sup>, GY, Sm<sup>-2</sup>, GN, spikelet per spike and 1000-grain weight losses was 27%, 15%, 10%, 6% and 6%, respectively. Wheat grain yield loss attributed to mallow weed ranged from 7 to 32% at 50 kg.N.ha<sup>-1</sup> to 9 to 21.8% at 200 kg.N.ha<sup>-1</sup>. The highest and the lowest weed individual dry weight was belonged to 200 and 50 kg.N.ha<sup>-1</sup>, respectively. Agronomic N efficiency (ANE) of wheat decreased as the weed density increased. Wheat grain yield in mallow infected plot generally enhanced with N fertilization while the density of mallow weed increased. Wheat competitiveness, GY and ANE were improved as N rate increased.

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## **Characterization of the Long-Term Rainfall Pattern at a Semi-Arid Ecotope in the Limpopo Basin in South Africa**

Adequate knowledge of rainfall regime is an important prerequisite for agricultural planning. Despite the importance of rain-fed agriculture to food security in the semi-arid regions of South Africa, studies to understand the spatial and temporal variability of rainfall are not widely documented. Twenty three years (1983-2005) of rainfall data were analyzed in order to understand the basic statistical parameters of the rainfall pattern at an ecotope at the University of Venda (Limpopo, South Africa). Probability density functions were used in the analysis of the distribution of rainfall frequencies. Annual and monthly rainfall data were fitted to empirical probability density functions. The "goodness of-fit" of the probability density functions, to the rainfall data, was evaluated, using various statistical methods (including Shapiro-Wilk and Kolmogorov-Smirnov tests). The probability of receiving annual and monthly rainfall was predicted using appropriate probability density functions. Similarly, the probability of wet days and dry spells of different durations was determined. It was found that annual rainfall fitted normal distribution whilst monthly rainfall between October and March was described by lognormal distribution. Characterization of the cumulative frequency analysis of daily rainfall amounts showed that the distribution of daily rainfall was highly skewed with a relatively high frequent occurrence of low rainfall. The distribution of daily rainfall depths was also highly skewed, depicting a comparatively small proportion of rain-days supplying a high percentage of the rainfall in a given period. The findings of this study have major implications on the choice of cropping systems at the site or similar agro-ecologies in the region. Crop technologies that are adapted to the precipitation pattern or methods that involve effective water harvesting during tropical storms will be desirable.

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## **Pathogenic and Molecular Characterization of Pythium Species Inducing Root Rot Symptoms of Common Bean in Rwanda**

A series of 231 samples of bean plants affected by bean root rot were collected from different areas of Rwanda in order to characterize the causal agents. The collected samples were used to isolate 96 typical *Pythium* colonies which were classified into 16 *Pythium* species according to their respective molecular sequences of the ribosomal ITS fragments.

Inoculation assays carried out on a set of 10 bean varieties revealed that all identified species were pathogenic on common bean. However, the bean varieties used in this investigation showed differences in their reaction to inoculation with the 16 *Pythium* species. In fact, the varieties CAL 96, RWR 617-97A, URUGEZI and RWR 1668 were susceptible to all the *Pythium* species while the varieties G 2331, AND 1062, MLB 40-89A, VUNINKINGI, AND 1064 and RWR 719 showed a high level of resistance to the all *Pythium* species used in our study. This high level of resistance to *Pythium* root rot disease found in diverse varieties of common bean grown in Rwanda constitutes a real advantage to be exploited as source of resistance in breeding programs aiming to increase resistance to the disease in the most popular bean varieties grown in Rwanda.

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## **Maize Oil for Health Importance**

Maize is one of the most popular cereals in the world and forms the staple food in many countries including USA, Africa etc. Health benefits of maize are offered by presence of quality nutrients in it. It not only provides the necessary calories for daily metabolism, but also is a rich source of vitamins A, B, E and many minerals. Also maize oil is useful. Maize oil is the most widely consumed in the world. Because this oil is generally less expensive than most other types of vegetable oils. Recently, many researches have discovered the strong antioxidant potential mostly in maize oil. Health benefits of maize oil include controlling diabets prevention of heart ailments, It has reduced hypertension and prevented neural-tube defects at birth. The maize oil is prone to be absorbed by human bodies and the absorption ratio is as high as % 97. Thus, it's an ideal edible oil and healthcare oil. In famillies of Europe and USA valuing the diet nutrition and health, they generally choose maize germ oil as the major edible oil.

The aim of this overview research is to revise the most recent studies of maize oil, its benefits and its about maize oil and health.



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## **Effects of Presowing Treatments on Germination of Seeds of *Onobrychis* Species**

Grasslands in the Mediterranean have long been grazed by animals. Uncontrolled grazing and unfavorable climate cause the removal of liked species from the vegetation. Seeding is one of the proper ways to improve degraded rangelands. For this, seeds collected from the vegetation are used in many countries. Seeds of wild plants, however, show a high level of dormancy, thereby causing problems in propagation. To solve this problem, we determined in this study the germination ratios of the seeds from *Onobrychis oxyodonta* and *Onobrychis gracilis* which are all common in the region and preferred by the animals, and also tested the ways of improving germination. Presowing treatments applied were manual scarification, boiling water, hot water, and sulphuric acid. Manual scarification, boiling water and sulphuric acid did not have positive effects on the germination ratio of the species. Seeds collected three years ago did not germinate in the control treatment. The highest germination percentages were obtained in the hot water treatment (70°C) of the seeds of *Onobrychis oxyodonta* (29.50%) and *Onobrychis gracilis* (11.50%). The results show that seeds of these species should be sown following hot water treatment if the rangelands in the Mediterranean are to be sown with these species.

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**Leafminer (*Cameraria ohridella* Deschke & Dimic, 1986, Lepidoptera: Gracillariidae), the pest of horse chestnut (*Aesculus hippocastanum*) in Marmara Region of Turkey**

*Cameraria ohridella* Deschke & Dimic, 1986 (Lepidoptera: Gracillariidae) was first reported on the white flowering horse chestnut trees (*Aesculus hippocastanum* L., Sapindales: Hippocastanaceae) in Macedonia in 1984. Then, it has spread to many other European countries and is presently the most dangerous pest of horse chestnut. In Turkey, firstly this pest was determined on horse chestnut trees in Belgrade forests of Istanbul in 2005. In this study, some biological properties and the distribution of *Cameraria ohridella* was investigated in Marmara Region of Turkey. As a result, it is determined that infested by *C. ohridella* on the horse chestnut trees of Karaağaç district of Edirne provinces and in parks and gardens of Istanbul, in the other places of Marmara Region were not infested with this pest. Also, control methods and the biological properties of the horse chestnut leafminer were evaluated.

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## **Impact of Agronomic Practices on Weeds of Winter Wheat-Vetch/Maize Rotation in a Semiarid Region: Tillage Systems**

A long-term rotation experiment was established in 2001 to compare conservation or reduced tillage systems (rototiller and chisel tillage) with conventional tillage system using mouldboard plough in a semi-arid Mediterranean climate region where cropping systems are generally characterised by continuous cultivated cereal monoculture. Field experiments were conducted to determine weed density and grain yield of cropping systems in a crop rotation of winter wheat-winter vetch/summer maize (*Zea mays* L.) from 2001 to 2009.

Results indicated that, after applying tillage systems, *Veronica persica* Poiret was found the highest weed species with rototiller in vetch, while it was higher with chisel in wheat. Similarly, *Sinapsis arvensis* L. was significantly higher with rototiller and chisel in wheat. *Convolvulus arvensis* L. was the dominant weed species with rototiller in both vetch and maize, while *Phalaris paradoxa* L was high with rototiller in maize. Rototiller markedly increased total weed density by 72% and 58% in maize and vetch, respectively, as compared with plough, while total weed density was statistically similar for three tillage systems in wheat. Maize yield was significantly higher for rototiller and the lowest for chisel compared to plough, but there were no significant differences in wheat yield between tillage systems. In contrast, vetch planting resulted in a low yield for rototiller, while there were no significant differences between plough and chisel over average of all vetch growing seasons.

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## **The Reaction of Different Forms of Oats to Sprinkler Irrigation and Nitrogen Fertilization**

The average yield of oats in Poland in 2009 reached 26.9 dt ·ha<sup>-1</sup>. The need to increase the yield of oats is justified both on economic and natural reasons.

The aim of the study was to assess the reaction of some forms of oats to sprinkling irrigation and nitrogen fertilization.

The study involved the period between 2008 and 2009 was conducted at Złotniki Experimental Station of the Poznań University of Life Sciences in Poland. The experimental field soil was classified as being bonitation group IVa and IVb, complex 5 (good rye).

The experimental factors were as follows:

- water variant (without sprinkling irrigation, with sprinkling irrigation),
- form of oats (STH 7105 - hulled oats, dwarf, STH 8007 - hulled oats, high; POLAR-naked oats)
- nitrogen fertilization (0, 50, 100, 150 kg N ·ha<sup>-1</sup>).

Irrigation took place when the soil humidity dropped below 70% of the field water capacity.

Oats was cropped after winter triticale in a four-field crop rotation with 50% share of cereals.

Nitrogen fertilization at 50 kg N·ha<sup>-1</sup> prior to sowing and on appropriate objects was performed at the tillering stage (BBCH 21) and at the stem elongation stage (BBCH 31).

The results were subject to statistical evaluation with a variation analysis method. A detailed test was carried out according to Tukey at a confidence level of P = 0.95.

Oats grain yield depended on sprinkling irrigation, the forms of oats and nitrogen fertilization, and their mutual interaction. Yield increase under the influence of irrigation to a large extent depend on weather conditions, and the average was about 52%. The interaction between irrigation and fertilization expressed by the fact that in non irrigated oats significant increase in grain yield was obtained with increasing dose up to 100 kg N ·ha<sup>-1</sup>, while in irrigated oats significant yield increase was recorded for a dose of 150 kg N ·ha<sup>-1</sup>.

**Anna Podbudkiewicz**  
Scientist, Institute of Horticulture, Poland.

## **The Influence of Flurprimidol on Pot Chrysanthemum Growth and Reduction of Water Consumption by Plants**

The study was undertaken to evaluate the effectiveness of flurprimidol in controlling height of pot chrysanthemums *Dendranthema grandiflora* Tzvelev cvs Kodiak and Jewel Time and to estimate water consumption by flurprimidol treated plants. The plants were grown in the greenhouse, in conditions of controlled short photoperiod (blackout from 5 p.m. until 7 a.m.) since the day of potting. Growth retardant flurprimidol (Topflor 015 SL) was applied following the pinching, as a single foliar spray, at concentrations of 0, 7.5, 15 and 22.5 mg l<sup>-1</sup>. Flurprimidol was effective growth retardant in reducing stem extension without adverse side-effects. As compared to untreated plants, the maximum reduction in plants height obtained were 51% and 39% in 'Jewel Time' and 'Kodiak', respectively. Flurprimidol treated plant canopies of 'Jewel Time' and 'Kodiak' were significantly smaller and more compact than those of the control plants. The leaf size and inflorescence diameter were not affected by flurprimidol in 'Jewel Time' but they were slightly smaller in 'Kodiak' as compared to the untreated plants. Flowering time was delayed by 2 and 3 days in flurprimidol treated 'Kodiak' and 'Jewel Time', respectively. Intensified green leaf pigmentation was observed on flurprimidol treated plants. In this study water consumption was markedly reduced by all flurprimidol treated plants. As compared to the controls, water consumption was reduced up to 45% by 'Jewel Time' and up to 32% by 'Kodiak'.

**Jorge Luis Ruiz Rojas**

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**Rey Gutierrez Tolentino**

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**Bernardo Sanchez Munoz**

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**Luis Enrique Aguilar Marquez**

## **Development Perspectives for Production of Organic Milk in the State of Chiapas, Mexico**

Due to world-wide concerns regarding the environment and food quality, a new market has opened for so-called organic, ecological, or biological products which are free of agro-chemicals and are raised in an environmentally friendly manner as compared to conventional foods. Of all Mexican states, Chiapas occupies first place in land area dedicated to organic agriculture and in number of producers raising organic food. Close to 220 farm organizations with total of 67,000 members, market more than 20 different organic products. More than 50% of land dedicated to organic production in Mexico is planted with coffee. As a result, the state of Chiapas is the principal producer and exporter of organic coffee in the world, even as compared to other countries. Furthermore, Chiapas is the major producer of organic honey in Mexico and also occupies the first place nationally in organic milk production in terms of number of hectares, number of dairy cows, and number of producers. As a result, organic milk production plays currently an important role in development of small scale agriculture, and thus represents an opportunity for rural families. Organic agriculture is in accordance with principals of silvopastoral systems and results in production of healthy food, contributes to reducing greenhouse gas emissions and helps mitigate climate change. The objective of this study is to describe the current situation concerning organic milk production in Chiapas, Mexico and to indicate its future potential for development.

**Manfred Sager**

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## **Input of Accessory Elements from Various Mineral and Organic Fertilizers to Arable Soils**

Sustainable soil management means to supply nutrient and essential element loads close to crop consumption by fertilization. Usually, the dosage of fertilizer to soils is based on nutrient N-P-K-S load per hectare. Mineral fertilizers are easy and hygienic to handle. Nitrogen components, K-salts and limes are generally low in accessory elements. Except for cadmium (and possible uranium and rare earths), the concentration levels encountered in natural phosphates, are also usually below soil levels. Increasing populations of men and domestic animals, together with limited space and limited availability of mineral phosphates, however, necessitates recycling of organic wastes. This also helps to maintain the carbon cycle, which is a prerequisite for microbial life. Manures, dungs, composts, and garden moulds are products of agriculture or related facilities. Increasing amounts of urban bio-waste are recovered from separate sampling in towns, in particular from gardening in suburbs, which might also contain household-waste from cooking and spoiled food.

Various mineral fertilizers, organic fertilizers (manures, dungs, composts, garden moulds), urban bio-waste, urban street-dusts, and human urines have been submitted to ICP- multi- element analysis after quasi total digestions (without hydrofluoric acid). Median loads of accessory elements per kg N resp. kg P have been evaluated in order to detect possible accumulations of accessory elements in soils indicative for certain fertilizer types. For composts, total element contents were generally higher than for bio-wastes, except for Na. In manures, however, some elements were also higher than in urban bio-waste (Cd, Cu, Mg, Mn, Mo, Ni, P, Zn), whereas others were at the same level (Be, Ca, Co, Cr, Pb, Sr, V). For Al, Fe, Ba and Na, the concentrations ranges in bio- wastes were significantly wider than for the manures.

Some elements, which are regarded as essential to ensure optimum growth of domestic animals (like Cu-Zn-Se-I), were present in manures significantly above ambient levels. Human urine contained significantly more Na than manures from agriculture, as well as a higher Ca/Ba proportion, but the Ca/Mg-proportion was about equal. This salinization is also reflected in regional differences between manure from low and highly populated regions in Austria. Urban street dusts carry a lot of contaminant metals, and should not be transferred to arable soils at all.

Inputs via fertilization practices are compared with regional soil composition and atmospheric deposition data. Possible enrichments in the soil or in the food chain are discussed.



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## **Toxicity of Expired and Unexpired Trichlorfon: A Comparative Study**

Trichlorfon is a broad-spectrum organophosphate insecticide used to control a range of insects in a variety of horticultural and agricultural crops. It is also used as a veterinary medicine.

Trichlorfon primarily affects the nervous system through inhibition of cholinesterase, and enzyme required for proper nerve functioning. Other target organs include the liver, lungs, and bone marrow . Pesticide pollution not only affects human health, but also affects multiple other environmental factors. Mainly, soil, surface and ground water, crop productivity, micro and macro flora and fauna. Despite such environmental and health effects, farm workers also experience day to day acute effects of pesticides use with varying degrees of severity and such Abdominal cramps. Diarrhoea. Laboured breathing. Nausea. Unconsciousness. Vomiting. Weakness. skin irritation and respiratory discomfort. In this study the organophosphorus pesticide trichlorfon was used, rabbits (1kg weight), were separated in 3 groups gavaged by 1/2 LD50 for 3 weeks (one dose every week). 1st group as a control, 2nd group treated with unexpired trichlorfon and the 3rd group with expired trichlorfon. Blood was collected before dosing and after 48hours treatment. Enzyme activities were assayed in the plasma samples obtained. GOT, GPT, ALPH, CREA, Glucose and Total Pro were measured. The results showed a decrease in RBC; WBC and Hb. This probably explained by the effect of trichlorfon on the erythropoiesis. An increase of plasma enzyme activities in GOT, GPT and CPK were recorded, explain a high energy-generating product. An increase, in the plasma enzyme activity in Alkaline phosphatase, related to their role in the cell permeability. The histopathological results showed lesions and morphological changes of liver paranchyme and appearance of inflammatory infiltrate, confirmed disturbances of the biochemical parameters. These changes were much underlines during

the animal toxicity. Similar alterations were noticed either when expired or unexpired trichlorfon were administered.

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## **Soil Extractable Zn and the Translocation Factor in the Barley as Affected by Organic and Inorganic Zn Sources**

The objective of this study was to investigate the effect of organic and inorganic Zinc (Zn) sources on the soil DTPA-extractable Zn and its uptake by barley in a clay loam soil amended with organic and inorganic Zn sources. A field experiment with completely randomized block design was performed with seven treatments in three replicates. A Zn enriched vermi-compost (800 mg Zn kg<sup>-1</sup>) was applied to the soil at three rates of 25 (V<sub>1</sub>), 50 (V<sub>2</sub>), and 100 Mg ha<sup>-1</sup> (V<sub>3</sub>). To compare the effects of organic and inorganic sources, similar rates of Zn as ZnSO<sub>4</sub> were also applied (Zn<sub>1</sub>, Zn<sub>2</sub> and Zn<sub>3</sub>, respectively). An untreated soil sample was also considered as control soil (V<sub>0</sub>). Results showed that increasing the loading rate of Zn from both organic and inorganic sources significantly increased the soil DTPA-extractable Zn. At the same loading rate, the DTPA-extractable Zn in the soils treated with ZnSO<sub>4</sub> was significantly greater than the vermi-compost amended soils. The ability of plants to translocate Zn from roots to shoots is measured by calculating the translocation factor (TF). The TF value ranged from 0.18 to 0.53 with the greatest values of 0.53 and 0.49 for inorganic (Zn<sub>2</sub>) and organic (V<sub>3</sub>) treatments, respectively. At the greatest loading rate of Zn as ZnSO<sub>4</sub>, the TF value significantly decreased. The results of this experiment point to the fact that the source and the loading rate of Zn are important factors in determining Zn phyto-availability.

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## **Environmental Challenges for Agro-Ecosystems and Research Opportunities**

Agrochemicals and animal manure are extensively used in the U.S. to increase crop production, but their improper use has caused serious water quality implications for both surface and groundwater resources. For the Chesapeake Bay, one of the world's largest estuaries located in East Coast USA, nonpoint sources of pollutants (NPS) from agriculture contribute approximately 42% of the nitrogen and 48% of the phosphorus that reach the bay. Agriculture also accounts for 66% and 65% of the total national phosphorus and nitrogen discharges, respectively.

Nutrient loadings from nonpoint and point sources have resulted in hypoxic conditions in many of the world's vital water bodies. Hypoxic conditions have been increasing since 1960 ([http://www.wau.boku.ac.at/fileadmin/\\_/H81/H815/Skripten/Kanwar/Chapter09.pdf](http://www.wau.boku.ac.at/fileadmin/_/H81/H815/Skripten/Kanwar/Chapter09.pdf)). The worst hypoxic conditions are in Baltic Sea and the Black sea. The Gulf of Mexico is the third largest hypoxic area in the world. Such degradations limit the availability of good quality water for human and habitat survival and health. Many regions have established guidelines and approaches under different policy criteria (e.g., European Water Directive and US's TMADL criteria under Clean Water Act of 1972) to combat pollution. This presentation provides an overview of the damage to our water resources. It presents localized data from Eastern United States to show possible methods such as monitoring and modeling strategies to identify pollution problem from agricultural sources and identify Best Management Practices (BMPs) for sustainable agro-ecosystem. Finally, the review indicates seriousness of the pollution in Chesapeake Bay by showing the 2009 score card. Although score card for Chesapeake Bay is very disappointing, it provides us with the opportunity to reexamine our production systems for more sustainable management of our natural resources. This study concludes that more research and education is of vital importance to combat NPS and Agricultural Experiment Stations can play a vital role in meeting the environmental challenges.

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**Cryopreservation of *Dendrobium* Bobby Messina  
Protocorm-like Bodies by Encapsulation-  
Dehydration Technique**

Protocorm-like bodies (PLB) of *Dendrobium* Bobby Messina, a new commercial orchid hybrid, were cryopreserved by vitrification method. In this study, protocorm-like bodies (PLBs) with the size range of 3-4 mm were selected from 4 weeks old culture, precultured with half strength semi-solid MS media supplemented with 0.6 M and 0.2 M sucrose at 25°C for 0-5 days. Precultured PLBs were then treated with a mixture of 2 M glycerol and 0.4 M sucrose supplemented with half strength liquid MS media at 25°C for 20 minutes. Osmoprotected PLBs were then dehydrated with plant vitrification solution 2 (PVS2) at 0°C or room temperature for 0-140 minutes before storage in liquid nitrogen. After rapid warming in a water bath at 40°C for 90 to 120 seconds, the PLBs were washed with half strength liquid MS media supplemented with 1.2 M sucrose. Subsequently, the PLBs were cultured on half strength semi-solid MS media supplemented with 2% sucrose without the presence of any growth regulators. Survival of the cryopreserved PLBs was assessed based on triphenyl tetrazoliumchloride (TTC) spectrophotometrical analysis. The PLBs with 3-4 mm size range showed higher viability comparative to size range of 1-2 mm for both cryopreserved and non-cryopreserved PLBs. The best preculture condition was PLBs precultured with 0.6 M sucrose supplemented with half strength MS media for 1 day and the best PVS2 temperature and exposure duration was at 0°C for 60 minutes. The best preculture condition was PLBs precultured with 0.2 M sucrose supplemented with half strength MS media for 1 day and the best PVS2 temperature and exposure duration was at 0°C for 40 minutes. The best parameters were chosen for cryopreserved and non-cryopreserved PLBs and further histological and molecular analysis were conducted to investigate the histological and molecular responses of the PLBs after cryopreservation.

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## **Determining Yield Response Factor of Sugarbeet in Konya Region**

This study was conducted in experiment fields of Konya Soil and Water Resources Research Institute at 2005 and 2006 years. It is aimed to determine the yield response factor (ky) of sugarbeet for total growth and individual growth period in this study. Ky values represents the plant response to water supply. Under the conditions of limited water, crops with the higher ky value will suffer a greater yield loss than the crops with a lower ky value. For determining ky values of sugar beet, different irrigation programs were planned by considering vegetative growth, root swelling and ripening period of sugar beet. The root yield and sugar yield were used separately to calculate ky values. The study was conducted at randomized block with three replacement. As a result of the study, For whole growth period, yield response factor (ky) was determined as 0.96 and 1.09 in 2005 and 2006 respectively. Ky for individual growth periods was determined as 1.81 and 1.23 for vegetative growth period, 0.82 and 0.97 for swelling period and 1.21 and 1.07 for ripening period in 2005 and 2006 respectively. According to results obtained from this study, it was determined that sugar beet is most sensitive to water deficit at vegetative growth period and is not sensitive to water deficit at swelling period.

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## **Going Organic or Conventional? A Case Study for the Farm Specific Factors Affecting the Transition to Organic Farming in Lake Kerkini: Greece**

The changes in the Common Agricultural Policy (CAP) during the last decades, in conjunction with the change in consumer preferences and the food related crisis of the last few years, have created a new economic, political and social environment for agricultural markets. These changes lead many farmers in Greece to adopt alternative farming methods in order to remain competitive in world markets. Organic farming is among the most popular of those methods.

The objective of the present study is to examine what farm specific factors affect the decision to adopt organic farming in the Lake Kerkini region. A choice model is utilized in order to estimate the marginal effect of seven different characteristics on that decision.

The data set includes information for 70 farms, of which 25 are organic and 45 are conventional. Personal interviews with the farm decision makers, of the selected farms, were the main data source for the study. The choice of Lake Kerkini was based on a preliminary inventory of organic farms, published by the Agricultural Economics and Research institute, which indicated the aforementioned area as one of the leading regions regarding organic farming in Greece.

The findings of the study indicate that each additional year of education increases the probability of adopting organic farming by 6%. Furthermore, the most influential factor on adopting organic farming was direct sales. Specifically, if a farm engages in direct sale marketing, then it is 55% more likely to adopt organic farming. On the other hand, if the farm manager has off farm employment, then, adoption of organic farming is 36% less likely compared to farms where the decision makers do not have off-farm employment. Additionally, the household size had a negative impact on the decision to adopt organic farming.

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## **Variable Rate Application of Nitrogen on Cotton in Georgia, USA**

A project to quantify NDVI and other vegetation index (VI) response of cotton to different nitrogen application rates in Georgia, USA was conducted during 2010. The project consisted of a replicated experiment which compared seven treatments of nitrogen. The treatments (45 replicates) consisted of 4-row strips 30 to 60 m long in a 2.5 ha field. Treatments were comprised of a combination of two side-dress N applications. Total side-dress rates ranged from 0 to 100 kg N/ha. Total N rates (pre-plant + side-dress) ranged from 25 to 125 kg/ha. All other inputs (herbicides, plant growth regulators, etc.) were applied at constant rates. A GreenSeeker RT200 was used to monitor crop reflectance in the field at weekly intervals beginning in mid-June. The red and NIR reflectance response of each sensor was recorded individually and used to calculate 6 different vegetations indices (VIs) including NDVI. The paper presents the results from this project including NDVI and yield response to the N treatments. Results from this project will be used to develop a variable rate N algorithm specific to Georgia conditions.



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## **Investigation of *Vibrio* spp. at the Andaman Sea, Thailand**

Marine ecosystems are complex and dynamic. *Vibrio* spp. are Gram negative bacteria, highly abundant in marine environment and are found as free-living and in association with many marine organisms. Some of them are human pathogens and some are associated with marine animal diseases, coral diseases, antibiotic production, toxic product degradation and the cycling of organic matter in aquatic settings. Since vibrios are one of the major bacteria in aquatic environment, diversity of vibrios in Andaman Sea was investigated by cultivation and Denaturing Gradient Gel Electrophoresis (DGGE) technique. Water samples were collected by filtration through a 0.22 µm membrane filter. DNA was extracted and nested PCR was performed to amplify 16S rDNA of *Vibrio* spp. Amplified products were subjected to DGGE to generate fingerprints of PCR products. By cultivation on TCBS, *V. harveyi* was the predominant isolates at Son Bay whereas *V. harveyi* and *V. alginolyticus* were the predominant isolates at Ruesri Bay. *V. brasiliensis*, a novel sp. of *Vibrio* was detected predominantly in April and March at Son Bay and Ruesri Bay respectively. DGGE analysis of uncultured *Vibrio* spp. revealed that similar *Vibrio* spp. including *V. harveyi*, *V. parahaemolyticus*, *V. proteolyticus*, *V. aestuarianus*, *V. neptunius*, *V. brasiliensis* were detected in every month at Son Bay except that *V. hepatarius* was replaced by *V. parahaemolyticus* in December. In Ruesri Bay, the detected *Vibrio* spp. was more heterogenous. It was of interest that in December although *V. parahaemolyticus* was not detected by cultivation, it was present in this month according to the DGGE technique. Thus, the number of this bacterium was probably low or it was in a non-culturable phase. In this study, *V. harveyi* was detected in both areas every month either in cultured or uncultured form. This indicates that this bacterium is present in the Andaman Sea throughout the year.

**Becky Westerdahl**

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## **Cultural and Biological Methods for Management of Plant Parasitic Nematodes**

The loss or restriction of use of nematicides in recent years has rekindled an interest in the use of cultural and biological practices to manage microscopic roundworms that feed on the roots of vegetables and ornamentals. Although the nematode control obtained through individual cultural or biological practices is likely to be less than that provided by traditional fumigant nematicides, recent developments offer new tools to fine tune their use in vegetable and ornamental cropping systems. The commercial availability of several biological nematicides, development or selection of cover crop varieties for use against particular nematode species, the use of green manures, biofumigation, and trap cropping are promising techniques. Combining these with the development of molecular techniques for identification of plant-parasitic nematodes to species, online databases to rapidly search out nematode resistant crops, computerized soil temperature monitoring equipment, computer models for calculating nematode degree days, and a greater understanding of nematode biology and population dynamics make it possible to develop promising scenarios to reduce damaging nematode populations and increase yields.

**Yu Feng Yang**  
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## **Mariculture Development and Environmental Protection of the Coastal Waters in China**

China has become the country with highest mariculture production in the world for 30 years. In 2008, the total mariculture production reached 13.403 million tons from a production area 1,578,909 ha. The rapid development and changes of mariculture species in the past decades have resulted serious eutrophication in some mariculture areas. Seaweed cultivation has been reconsidered to reduce the environmental impact of cultural eutrophication. Within the mariculture sector, the culture of the red agarophyte, *Gracilaria*, has also rapidly expanded in China over the past 10 years. Production of *Gracilaria* reached 99,451 t in 2007. The principal species being cultured throughout China is *G. lemaneiformis*. This seaweed grows very well in Chinese coastal waters. The specific growth rates (SPG) are up to 13.9% d<sup>-1</sup> in Jiaozhou Bay, Shandong Province. In laboratory experiments, the removal of NH<sub>4</sub>-N decreased 85.53 % and 69.45%, and the concentrations of PO<sub>4</sub>-P decreased 65.97 % and 26.74% with *Gracilaria* after 23 days and 40 days, respectively. *G. lemaneiformis* is very effective in decreasing N and P loadings. It is also able to inhibit the growth of some microalgae and may increase dissolved oxygen in mariculture areas. Large-scale *Gracilaria* cultivation can be an effective means of environmental protection and sustainable mariculture industry in Chinese coastal waters.

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## **Determining Energy Consumption of Sprinkler Irrigation in Different Crops at Konya Plain**

This study was conducted to determine the energy requirement of sprinkler irrigation established in different crops fields at Konya-Çumra irrigation district. The properties such as water resource, pumping unit, systems equipments, operation pressure, sprinkler's spacing of the sprinkler systems were investigated and determined with regards to crops. The research was conducted on totally 69 sprinkler system. In study, diesel fuel or electricity energy, equipment manufacture energy and labour energy consumption of the sprinkler systems were determined.

According to results obtained; in sprinkler irrigation systems induced motopomp, the annual energy consumptions of per unit area (1 ha) for diesel fuel, equipment energy and labour energy were found as 14107, 923 and 44 MJ/ha-year on average, respectively. In centrifugal pumping systems induced by power take-off shaft, this values were computed to be 21458, 3700 and 41 MJ/ha-year, respectively. In vertical axle pump system induced by power take-off shaft, the annual energy consumptions of per unit area (1 ha) for diesel fuel, equipment energy and labour energy were computed as 35748, 3873 and 40 MJ/ha-year. In vertical axle pump induced by electric motor, this values were calculated to be 35941, 1164 and 42 MJ/ha-year and in submersible pumping systems this values were computed as 47152, 1321 and 37 MJ/ha -year, respectively.

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## **Anaerobic Ammonium Oxidation Process Performance with Optimum Bicarbonate Concentration**

### **Introduction**

Biological treatment of wastewaters coming from agricultural processes (liquid manure, nitrogen fertilizers), also reject water from municipal wastewater treatment plant anaerobic digestion is energy - consuming. These wastewaters contain only low biodegradable organic carbon and high concentration of ammonium and their environmental impact is high.

The anammox (anaerobic ammonium oxidation) process is alternative to conventional nitrification - denitrification process as in this process  $\text{NH}_4^+$  is oxidized to nitrogen gas using  $\text{NO}_2^-$  instead of  $\text{NO}_3^-$  as the terminal electron acceptor (Mulder et al., 1995). In treatment of substrate with low organic C / N ratio autotrophic nitrogen removal process is energetically beneficial, because when process applied there is no need for additional carbon source addition in the biological process.

Moving - bed biofilm reactor configuration is determined to be effective for biomass immobilization and anammox enrichment, Its positive sides involve compactness, tolerance to inhibiting substances, and good biomass detainment in the process.

Anammox bacteria, which are strictly anaerobic autotrophic bacteria, are difficult to enrich and also different implementations of this process are limited partly by low availability of anammox biomass due to its slow growth rate (doubling time approximately 9 days). To our knowledge successful enrichment of anammox bacteria directly

from wastewater on biocarrier elements without using seeding sludge has not been reported.

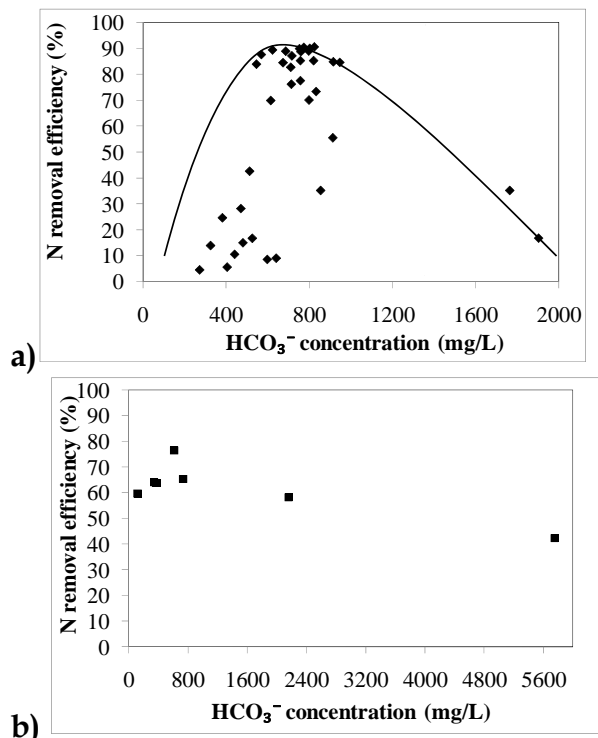
The chemolithoautotrophic bacteria (as Anammox bacteria) use inorganic carbon as a carbon source. Therefore, the concentration of the bicarbonate ( $\text{HCO}_3^-$ ) content in the bioreactor media is an important factor to affect the enrichment of Anammox organisms and TN (total nitrogen) removal efficiency by Anammox. However, when we take account of the cost factor, a high  $\text{HCO}_3^-/\text{TN}$  ratio is not economic for industrial applications. Therefore, inorganic carbon source concentration has to be optimized. By so far optimal  $\text{HCO}_3^-$  concentrations of around 1500 mg/L have been reported as optimal for Anammox process in activated sludge systems (Liao et al., 2008; Yang et al., 2010).

The aims of the study were to enrich anammox bacteria from reject water on moving bed biofilm reactors biofilm carriers without addition of seeding sludge. Also, in current study effect of  $\text{HCO}_3^-$  concentration on Anammox efficiency has been studied in biofilms system under flow through conditions and by batch analyses.

#### **Preliminary Results**

During MBBR operation TN removal efficiency increased from 4 to 90.6 % as  $\text{HCO}_3^-$  concentration was increased from 270 to 820 mg/L (Fig. 1a). The highest TN purification efficiency (90.6 %) was detected when the ratio  $\text{HCO}_3^-/\text{NH}_4^+$  was around 12.4. For  $\text{HCO}_3^-$  concentration of 820 mg/L the reaction ratio of  $\text{NO}_2^-$  removal,  $\text{NO}_3^-$  production and  $\text{NH}_4^+$  removal was 1.18:0.20:1, which was different from stoichiometrical (1.31:0.26:1) (Strous et al., 1999) proposably by the more intensive reaction between hydrazine and hydroxylamine with optimal  $\text{HCO}_3^-$  concentration, which produced external  $\text{NH}_4^+$ . For  $\text{HCO}_3^-$  of 1760 mg/L TN removal efficiency decreased to 17%.

Batch tests showed that during 8 h test period TN removal efficiency went up (from 60 to 77 %) with increased  $\text{HCO}_3^-$  concentrations from 120 mg/L to 730 mg/L (Fig. 1b). For  $\text{HCO}_3^-$  concentration of 730 mg/L the reaction ratio of  $\text{NO}_2^-$  removal,  $\text{NO}_3^-$  production and  $\text{NH}_4^+$  removal was 1.27:0.22:1, which was nearest to Strous et al. (1999). Below  $\text{HCO}_3^-$  concentration 730 mg/L lower TN removal efficiency might be caused by bicarbonate limitation effects due to lack of  $\text{CO}_2$  as the actual substrate for Anammox. For  $\text{HCO}_3^-$  concentrations over 730 mg/L TN removal efficiency decreased because of high hydrazine concentrations, which couldn't be removed biologically.



**Fig.1.** Dependence of TN removal efficiency and influent alkalinity in a) MBBR system, b) batch assays.

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