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Agriculture

Sixth Annual International Conference on Agriculture 15-18 July 2013, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Agriculture Abstracts

6th Annual International Conference Agriculture

15-18 July 2013, Athens, Greece

Edited by Gregory T. Papanikos

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(In Alphabetical Order by Author's Family name)

Preface

This abstract book includes all the abstracts of the papers presented at the *6th Annual International Conference on Agriculture, 15-18 July 2013,* organized by the Athens Institute for Education and Research. In total there were 53 papers and 64 presenters, coming from 29 different countries (Australia, Brazil, Canada, China, Costa Rica, Cyprus, Estonia, Germany, Hungary, Indonesia, Iran, Iraq, Japan, Korea, Latvia, Lebanon, Mexico, New Zealand, Pakistan, Poland, Saudi Arabia, Serbia, South Africa, Spain, Switzerland, Thailand, Turkey, UK, USA). The conference was organized into 15 sessions that included areas such as Genetics & Animal Production, Water & Soil, Land Use & Agricultural Policy, Ecology etc 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 150 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
6th Annual International Conference on Agriculture, 15-18 July 2013, Athens, Greece
PROGRAM

Conference Venue: Titania Hotel (52 Panepistimiou Avenue)

ORGANIZING AND SCIENTIFIC COMMITTEE

1. Dr. Gregory T. Papanikos, President, ATINER.
2. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
3. Dr. Nicholas Pappas, Vice-President Academics, ATINER & Professor, Sam Houston University, USA.
4. Dr. Costas Stathopoulos, Deputy Head, Environment and Agriculture Research Unit of ATINER & Lecturer, University of Newcastle, Australia.
5. Dr. Tala Awada, Professor, University of Nebraska, USA.
6. Dr. Konstantinos Giannakas, Professor, University of Nebraska-Lincoln, USA.
7. Dr. Emie Yiannaka, Associate Professor, University of Nebraska-Lincoln, USA.
8. Dr. Timothy Howe, Academic Member, Environment and Agriculture Research Unit of ATINER & Associate Professor of History and Ancient Studies, Saint Olaf College, USA.
9. Dr. John Hayes, Professor, Clemson University, USA.
10. Dr Amitava Rakshit, Faculty Member, Banaras Hindu University, Varanasi, UP, India.
11. Dr. Salah Mohammed Hassan Afifi, Professor, Assiut University, Egypt.
12. Dr. Reha Onur Azizoglu, Postdoctoral Research Associate, College of Veterinary Medicine, North Carolina State University, USA.
13. Dr. Salah Er-Raki, Professor, University of Cadi Ayyad, Morocco.
14. 14. Ms. Lila Skountridaki, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.
15. Mr. Vasilis Charalampopoulos, Researcher, ATINER & Ph.D. Student, University of Stirling, U.K.

Administration

Fani Balaska, Stavroula Kiritsi, Eirini Lentzou, Konstantinos Manolidis, Katerina Maraki & Celia Sakka

C O N F E R E N C E P R O G R A M

(The time for each session includes at least 10 minutes coffee break)

Monday 15 July 2013

08:00-08:30 Registration

08:30-08:35 Welcome and Opening Remarks

1. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
2. Dr. Gregory T. Papanikos, President, ATINER.

08:35-10:00 Session I (Room A): Water & Soil

Chair: George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.

1. *Tala Awada, Professor, University of Nebraska, USA. Water Use in a 58 Year-Old Even-Aged Stand of Invasive Woody Juniperus Virginiana L. In the Nebarska Sandhills, USA.
2. Ayad Ali Almaeini, Assistant Professor, AL-Qassim Green University, Hilla, Iraq. Water Stress Imposed at Different Growth Stages of Barley.
3. Nora Fayssal, PhD Student, Lebanese University / American University of Beirut, Lebanon & Christos Anastasiou, Assistant Professor, Frederick University, Cyprus. The Impact of Virtual Water Trading on the Water and Agricultural Policies in the Semi-arid Regions; The Case Study of Cyprus.

10:00-12:00 Session II (Room A): Land Use & Agricultural Policy

Chair: Nicholas Pappas, Vice-President Academic Affairs, ATINER & Professor, Sam Houston University, USA.

1. David Blandford, Professor, The Pennsylvania State University, USA & Katharina Hassapoyannes, Policy Advisor, European Parliament, Greece. Implications of CAP Reform for Greek Agriculture.
2. Pete Melby, Professor, Mississippi State University, USA, Sylvia Byrd, Professor, Mississippi State University, USA & Andrew Fruge, Professor, Mississippi State University, USA. A Sustainable Model for Producing the Yearly Vegetable and Fruit Needs for a Family in their Home Landscape.
3. Hung-Chun Lin, PhD Student, Technical University of Munich, Germany, Julia Huber, PhD Student, Technical University of Munich, Germany & Kurt-Jurgen Hulsbergen, Professor, Chair of Organic Agriculture and Agronomy, Technical University of Munich, Germany. Comparison of Nitrogen Use Efficiency of Agroforestry, Organic, and Conventional Farming Systems.

10:00-12:00 Session III (Room B): Ecology

Chair: *Tala Awada, Professor, University of Nebraska, USA.

1. *Sreekumari Kurissery, Associate Professor, Lakehead University, Canada, D. Balika, Lakehead University, Canada & Nandakumar Kanavillil, Associate Professor, Lakehead University, Canada. Spatial Heterogeneity in Periphyton Colonization: Edge Effect a Myth or Reality? (Ecology)
2. *Carlos Gonzalez-Benecke, Researcher, University of Florida, USA. Using a New Integrated Model to Assess the Effects of Thinning and Prescribed Fire on Pinus Palustris Carbon Sequestration.
3. *Satoshi Kameyama, Senior Researcher, National Institute for Environmental Studies, Japan, Chiharu Miyamoto, Senior Researcher, Action for Mangrove Reforestation: NGO, Japan, Seiji Suda, Representative, Action for Mangrove Reforestation: NGO, Japan, Tetsumi Asano, Senior Researcher, Action for Mangrove Reforestation: NGO, Japan & Seiichi Nohara, Leader, National Institute for Environmental Studies,

	Japan. Strategic Assessment and Restoration Approach for Mangrove Ecosystem in Vietnam. 4. *Nandakumar Kanavillil, Associate Professor, Lakehead University, Canada, CA Chantler, Lakehead University, Canada, D. Balika, Lakehead University, Canada & Sreekumari Kurissery, Associate Professor, Lakehead University, Canada. Periphyton Community Dynamics at Lake Couchiching, Orillia, Ontario: Influence of Water Depth. (Ecology)
12:00-13:30 Session IV (Room A): Crop Study **Chair:** David Blandford, Professor, The Pennsylvania State University, USA.	**12:00-13:30 Session V (Room B): Climate Change** **Chair:** *Satoshi Kameyama, Senior Researcher, National Institute for Environmental Studies, Japan.
1. Jesus Santillano-Cazares, Professor, Universidad Autonoma de Baja California, Mexico, Ivan Ortiz-Monasterio & William Ratin. Development of the Use of Sensors Technology for the Fertilization of Wheat (Triticum aestivum L.) in Mexicali, Baja California, Mexico. 2. Juan Martinez-Solis, Faculty and Researcher, Chapingo Autonomous University, Mexico, Margarita Gisela Pena-Ortega, Faculty & Researcher, Chapingo Autonomous University, Mexico & Juan Enrique Rodriguez-Perez, Faculty & Researcher, Chapingo Autonomous University, Mexico. Using Vigor Tests for Predicting Seedling Emergence of Vegetable Seeds Under Greenhouse Conditions. 3. Giorgos Papadavid, Researcher, Agricultural Research Institute, Cyprus, M. Hadjimitsis, Agricultural Research Institute, Cyprus, S. Perdikou, Agricultural Research Institute, Cyprus, N. Neophytou, Agricultural Research Institute, Cyprus & D. Hadjimitsis, Agricultural Research Institute, Cyprus. SEBAL Methodology for Estimating Crop Evapotranspiration in Cyprus. 4. Hasan Oz, Research Assistant, Suleyman Demirel University,	1. Suthirat Kittipongvises, Ph.D. Candidate, The University of Tokyo, Japan, Takashi Mino, Professor, The University of Tokyo, Japan. Examining The Influence of Psychological Factors on Global Climate Change Perceptions Held by Farmers in the Northeast of Thailand. **2.** *Anderton Lucy, Economist, Department of Agriculture and Food, Australia, Ross Kingwell, Chief Economist, Professor, Australian Export Grains Innovation Centre, Australia, David Feldman, Senior Economist, Department of Agriculture and Food, Australia, Vilaphonh Xayavong, Economist, Department of Agriculture and Food, Australia, Jane Speijers, Biometrician, Private Consultant, Australia, Angela Wardell-Johnson, Social Scientist, University of the Sunshine Coast, Australia & Nazrul Islam, Senior Economist, Department of Agriculture and Food, Australia. The Impact of Climate Change and Adaptation Responses on the Success of Farm Businesses in Western Australia. 3. Eleni Karali, Research Associate, The University of Edinburgh, UK, Claire Vos, Senior Researcher, Alterra Wageningen, The Netherlands, Mark

Turkey, Atilgan Atilgan, Associate Professor, Suleyman Demirel University, Turkey, Zekai Gumus, Assistant Professor, Mustafa Kemal University, Turkey & Orhan Kurt, Graduate Student, Suleyman Demirel University, Turkey. General Status of Mushroom Production Buildings and View of the Neighboring Families Mushroom Production Buildings – The Case of Korkuteli.	Rounsevell, Professor, The University of Edinburgh, UK & Pytrik Reidsma, The University of Edinburgh, UK. Climate Change Adaptation Measures in the Sectors of Agriculture, Water and Nature Management-A Review for Cool Temperate Regions.

13:30-14:30 Lunch (details during registration)

14:30-16:00 Session VI (Room A): Plants **Chair:** Juan Martinez-Solis, Faculty and Researcher, Chapingo Autonomous University, Mexico.	**14:30-16:00 Session VII (Room B): Biofuel & Oceanography** **Chair:** *Carlos Gonzalez-Benecke, Researcher, University of Florida, USA.
1. Ibrahim Erdal, Professor, Suleyman Demirel University, Turkey, Hakan Aktasm, Associate Professor, Turkey, Zeliha Kucukyumuk, Research Assistant, Turkey, Selda Daler, MSc. Student, Turkey, Ozden Ozen, MSc. Student, Turkey, Kemal Gencer, MSc. Student, Turkey. Effects of Different Growing Mediums on Nutrient Concentration of Eggplant in Soilless Culture. 2. Sarina Manandhar, PhD Student, Massey University, New Zealand, David Wooley, PhD supervisor, Massey University, New Zealand & Keith A. Funnell, Scientist, Plant and Food Research, New Zealand. Crop Architecture: Investigating 'Strigolactones' A New Plant Hormone Present In Branching and Non-Branching Varieties of Some Horticultural Species. 3. Ali Coskan, Associate Professor, Suleyman Demirel University, Turkey, Onder Ozal, Associate Professor, Suleyman Demirel University, Turkey & Ali Ozden, Associate Professor, Suleyman Demirel University, Turkey. Influence of Mycorrhiza Inoculation on Plant Growths of Triticale (x Triticosecale Wittmack) and Clover (Medicago	1. William Schillinger, Professor, Washington State University, USA. Oilseed Crops for Biofuel Production in Wheat-Based Cropping Systems in the Pacific Northwest, USA. (Ecology) 2. *Adriana Najar-Rodriguez, Research Associate, ETH Zurich, Switzerland, Jeannine Klaiber & Silvia Dorn. Plant Acclimation to Elevated CO_2: Impacts on Multitrophic Interactions with Insects. (Ecology) 3. Luiz Antonio Cesario de Oliveira, Professor, USP Universidade de Sao Paolo, Brazil & Simony Aparecida, Do Rego Barros Barbosa Cesário De Oliveira, Professor, University Paulista, Brazil. Universality, Urbe and University: A Transversal Environmental Thematic. 4. Bita Hedayat Alimir, Lecturer, Institute of Technical Agriculture, Iraq. Evaluation of Drought Tolerance in Bread Wheat (Triticum Aestivum L.) Via in Vitro Conditions.

sativa) in Sterile and non-Sterile Soils.
4. Muhammad Qasim Hayat, Assistant Professor & Muhammad Ashraf, Professor, Atta-ur-Rahman School of Applied Biosciences (ASAB), National University of Sciences and Technology (NUST), Pakistan & Catherine Kidner, Lecturer, University of Edinburgh, UK. Evolution Patterns of Western Himalayan Artemisia L. (Asteraceae).
5. Zarko Ivanovic, Researcher, Institute for Plant Protection and Environment, Serbia, Jovana Blagojević, Researcher, Institute for Plant Protection and Environment, Serbia, Veljko Gavrilović, Researcher, Institute for Plant Protection and Environment, Serbia, Tatjana Popović, Researcher, Institute for Plant Protection and Environment, Serbia, Svetlana Živković, Researcher, Institute for Plant Protection and Environment, Serbia, Slaviša Stanković, Researcher, Faculty of Biology, University of Belgrade, Serbia & Đorđe Fira, Researcher, Faculty of Biology, University of Belgrade, Serbia. Antimicrobial Activity of Bacillus Spp. in the Biocontrol of Different Phytopathogenic Agrobacterium Isolates.

16:00-17:30 Session VIII (Room A): Bacteriology and Mycology
Chair: *Adriana Najar-Rodriguez, Research Associate, ETH Zurich, Switzerland.

1. Alvaro Garcia, Professor, South Dakota State University, U.S.A. Salmonella, Campylobacter, and E. coli: Farm trends and implications for raw dairy products consumption.
2. *Olubukola Oluranti Babalola, Associate Professor, North West University, South Africa. Phylogenetic Screening for Antibiotic Producing Actinomycetes.
3. Vahid Jafari, Master of Science in Soil Microbiology, Soil and Water Research Institute, Iran, Ahmad Asgharzadeh, Scientific Staff of Soil Biology Department, Soil and Water Research Institute, Iran & Kazem Khavazi, Head of Soil Microbiology Research Department, Soil and Water Research Institute, Iran. Bio-diversity of *Bacillus Megaterium* as a Brilliant Bacterium for Human Life.
4. Tatjana Popovic, Researcher, Institute for Plant Protection and Environment, Serbia, Zoran Milićević, Researcher, Institute for Plant Protection and Environment, Serbia, Nenad Dolovac, Researcher, Institute for Plant Protection and Environment, Serbia, Žarko Ivanović, Researcher, Institute for Plant Protection and Environment, Serbia & Predrag Milovanović, Researcher, Galenika-Fitofarmacija, Serbia. Copper-Citrate as a Possibility for Control of Some Phytopathogenic Bacteria.

17:30-19:00 Session IX (Room A): Marketing
Chair: *Olubukola Oluranti Babalola, Associate Professor, North West University, South Africa.

1. Eva Ramos Martinez, PhD Student, University Polytechnic of Valencia, Spain, Manuel Herrera, Researcher, University Libre of Bruxelles, Belgium, Joaquín Izquierdo, Professor, University Polytechnic of Valencia, Spain & Rafael Pérez García, Professor, University Polytechnic of Valencia, Spain. Drinking Water Distribution Systems Characteristics on Biofilm Development: A Kernel Based Approach.
2. Amin Farshchi, Researcher, University of Leeds, UK, Mohammad Elahi, Professor, Ferdowsi University, Iran & Shabnam Imani, Lecturer, Islamic Azad University-Sofian Branch, Iran. Influence of Temperature and Residence Time of Main Liming Process on the Reduction of α-Amino Acids during Beet Juice Purification.
3. *Krzysztof Golacki, Professor, University of Life Sciences in Lublin, Poland, Bozenna Gladyszewsk, Professor, University of Life Sciences in Lublin, Poland, Pawel Kolodziej, Associate Professor, University of Life Sciences in Lublin, Poland & Zbigniew Stropek, Associate Professor, University of Life Sciences in Lublin, Poland. Testing of Mechanical Properties of Thermoplastic Starch (TPS) Films.

21:00–23:00 Greek Night (Details during registration)

Tuesday 16 July 2013

08:30-10:00 Session X (Room A): Agricultural Technology
Chair: *Arturo F. Castellanos-Ruelas, Professor-Researcher, Autonomous University of Yucatan, Mexico.

1. *Kamal Rashid, Professor, Utah State University, USA, Taylor Hatton, Ph.D. Student, Utah State University, USA & Shaun Barnett, Researcher, Utah State University, USA. Productivity Studies Utilizing Recombinant CHO Cells in Stirred-Tank Bioreactors: A Comparative Study Between Pitched-Blade and Packed-Bed Bioreactor Systems.
2. Emie Yiannaka, Associate Professor, University of Nebraska-Lincoln, USA, Van Tran, University of Nebraska-Lincoln, USA & Konstantinos Giannakas, University of Nebraska-Lincoln, USA. Consumer Attitudes and Labeling Regimes as Determinants of the Market Success of Food Nanotechnology.
3. Chamchuree Sotthikul, Lecturer, Chiang Mai University, Thailand, Parichat Choomporn, Chiang Mai University, Thailand & Kadsarin Getphayak, Chiang Mai University, Thailand. *In Vitro* Propagation of *Musa* 'Kluai Namwa Mali

08:30-10:00 Session XI (Room B): Nutrition
Chair: *V.C. Patil, Professor, King Saud University, Saudi Arabia.

1. Ozcan Baris Citil, Professor, University of Selcuk, Turkey, Mehmet Sezgin, Professor, University of Selcuk, Turkey, Abdurrahman Aktumsek, Professor, University of Selcuk, Turkey & Gokhan Zengin, Professor, University of Selcuk, Turkey. Effects of Different Fat Sources on Fatty Acid Composition and Cla Content of Eggs of Laying Hens.
2. Pedram Rezamand, Assistant Professor, University of Idaho, USA & Cynthia Scholte, Graduate Student, University of Idaho, USA. Effect of Increased Subcutaneous Fat Stores on Fatty Acid Composition of Blood Lipid Fractions and Productive Performance in Periparturient Dairy Holstein Cows.
3. Jana Apse, National Botanic Garden, Latvia & Aldis Karklins, Latvia University of Agriculture, Latvia. Influence of Soil Modification on Mineral Nutrition of Highbush Blueberries.

Ong'.	

10:00-11:30 Session XII (Room A): Herbal Medicine, Phytopathology **Chair:** *Kamal Rashid, Professor, Utah State University, USA.	**10:00-11:30 Session XIII (Room B): Land Escape & Rural Development** **Chair:** Pedram Rezamand, Assistant Professor, University of Idaho, USA.
1. *Arturo F. Castellanos-Ruelas, Professor-Researcher, Autonomous University of Yucatan, Mexico, L. Sanchez-Solano, Autonomous University of Yucatan, Mexico, L. Chel-Guerrero, Autonomous University of Yucatan, Mexico & D. Betancur-Ancona, Autonomous University of Yucatan, Mexico. Biological Activity Attributed to Tannins and Saponins in two Tropical Legumes. 2. Tomas de Jesus Guzman Hernandez, Professor, Technological Institute of Costa Rica, Costa Rica. Parasitic Nematodes Associated with Tropical Crops and Alternative Control Studies in the North and Atlantic Region in Costa Rica. 3. *Ramazan Topak, Professor, Faculty of Agriculture, University of Selçuk, Turkey, Bilal Acar, Associate Professor, Dr., Faculty of Agriculture, University of Selçuk, Turkey, Refik Uyanöz, Professor, Faculty of Agriculture, University of Selçuk, Turkey, Ercan Ceyhan, Associate Professor, Dr., Faculty of Agriculture, University of Selçuk, Turkey. Effect on Sugar Beet Yield of Partial Root Zone Fertilizer Applications under Partial Root Zone Irrigation Conditions by Drip Irrigation. 4. Ahmad Ali Shahid, Assistant Professor, Institute of Agricultural Sciences University of the Punjab, Pakistan. Use of Rhizobacteria for the Management of Soft rot Disease of Potato.	1. Phenchan Thardphaiboon, Agricultural Research Officer Professional Level, Ministry of Agriculture and Cooperatives, Thailand. Pineapple "Trat Si Thong" Production Technology in Eastern Cultivated Areas, Thailand. 2. Kate Stevens, PhD Candidate, Deakin University, Australia, Katherine Harrisson, Deakin University, Australia, Raylene Cooke, Senior lecturer, Deakin University, Australia, Rohan Clarke, Lecturer, Monash University, Australia, Andrew. F. Bennett, Associate Head of School (Research), Deakin University, Australia & Fiona Hogan, Lecturer, Monash University, Australia. Effects of Habitat Fragmentation on Breeding Behaviour, Mating Systems and Relatedness of Family Groups in the Co-operatively Breeding Grey-crowned Babbler *Pomatostomus Temporalis*. (Ecology) 3. Marian Weaving, Ph.D. Student, Deakin University, Australia, Kara Hower, Professor, Deakin University, Australia, Raylene Cooke, Professor, Deakin University, Australia & John White, Professor, Deakin University, Australia. Home Range and Habitat Use of the Tawny Frogmouth in Urban Environments. 4. Adile Tatliyer, Researcher, Suleyman Demirel University, Turkey, Ozgur Koskan, Assistant Professor, Suleyman Demirel University, Turkey & Deniz Alic Ural, Professor, Adnan Menderes University, Turkey. Applicability of Weibull, Log-Logistic and Cox Regression Models on Agricultural Data.

11:30-13:00 Session XIV (Room A): Irrigation and Cultivation
Chair: *Ivar Zekker, Chemist, University of Tartu, Estonia.

1. *V.C. Patil, Professor, King Saud University, Saudi Arabia. Precision Fertigation for Sustainable Agriculture in Saudi Arabia.
2. Xiying Zhang, Principal Investigator, The Chinese Academy of Sciences, China, Suying Chen, Professor, The Chinese Academy of Sciences, China, Hongyong Sun, Professor, The Chinese Academy of Sciences, China & Liwei Shao, Professor, The Chinese Academy of Sciences, China. Managing Limited Irrigation for Maximizing Grain Production in the North China Plain.
3. *Komariah, Lecturer, Sebelas Maret University, Indonesia, Dwi Priyo Ariyanto, Lecturer, Sebelas Maret University, Indonesia & Arief Noor Rachmadiyanto, Ph.D. Student, Sebelas Maret University, Indonesia. Analysis of Merapi Mount's Post-Eruption Soil and Volcanic Deposit Amended with Organic Matter and Mulch on Manihot Esculenta C. Growth.
4. Violeta Mugica, Researcher, Universidad Autónoma Metropolitana-Azcapotzalco, Mexico, José de Jesús Figueroa, Researcher, Universidad Autónoma Metropolitana-Azcapotzalco, Mexico & Naxieli Santiago, Student, Universidad Autónoma Metropolitana-Azcapotzalco, Mexico. Black Carbon and Gases from Biomass burning in Mexico. (Ecology)

13:00-14:00 Lunch (Details during registration)

14:00-15:30 Session XV (Room A): Genetics & Animal Production
Chair: Dwi Priyo Ariyanto, Lecturer, Sebelas Maret University.

1. *Ivar Zekker, Chemist, University of Tartu, Estonia. Anaerobic Ammonium Oxidation in Upflow Anaerobic Sludge Blanket Reactor for Reject Water Treatment. (Water)
2. Margarita Gisela Pena-Ortega, Faculty & Researcher, Chapingo Autonomous University, Mexico, Juan Enrique Rodriguez-Perez, Faculty & Researcher, Chapingo Autonomous University, Mexico & Juan Martinez-Solis, Faculty & Researcher, Chapingo Autonomous University, Mexico. Exploration of Genetic Variability of 'Mirasol' Chili (Capsicum Annum L.) Accessions through ISSR Markers.

17:30-20:30 Urban Walk (Details during registration)

21:00-22:00 Dinner (Details during registration)

Wednesday 17 July 2013
Cruise: (Details during registration)

Thursday 18 July 2013
Delphi Visit: (Details during registration)

Ramazan Topak
Professor, Faculty of Agriculture, University of Selçuk, Turkey
Bilal Acar
Associate Professor, University of Selcuk, Turkey
Refik Uyanoz
Professor, University of Selcuk, Turkey
Ercan Ceyhan
Associate Professor, Dr., Faculty of Agriculture, University of Selçuk, Turkey

Effect on Sugar Beet Yield of Partial Root Zone Fertilizer Applications under Partial Root Zone Irrigation Conditions by Drip Irrigation

This research was designated for two years and first year was completed in 2012 growing season. The results giving this paper were for the first year. Research was conducted at Konya-Turkey and aimed to determine the effects of partial root zone irrigation applications and partial root zone fertilizer applications on sugar beet yield and quality. In this respect, 3 irrigation and 3 nitrogen levels were performed. Irrigation treatments were full irrigation (FI), 50% of the full irrigation namely alternative partial root zone draying (APRD), and fix partial root zone drying (FPRD). Nitrogen treatments were amount of 100% (N100), 75% (N75) and 50% (N50) of the nitrogen requirements determined amount by experimental soil analysis. In first year of study, 65 kg N/ha pure nitrogen was determined in experimental soil. In this respect, 155 kg N/ha, 116 kg N/ha and 77.5 kg N/ha were applied to the N100, N75 and N50 plots, respectively. Before the sowing, 35 kg N/ha was applied to the all plots and rests dividing into four parts were applied by fertigation technique. The results showed that among partial root drying treatments the highest root yields were obtained from different nitrogen applied by APRD method.

Ayad Ali Almaeini
Assistant Professor, AL-Qassim Green University, Hilla, Iraq

Water Stress Imposed at Different Growth Stages of Barley

Afield experiment was conducted during winter season of 2011 – 2012 to study the effects of water stress imposed (by skipping irrigation) at different growth stages of barley (Hordeum vulgare spp. Vulgare) which was grown under different planting methods . A split block arrangements with completely randomized block design (RCBD) for three replicates involving four planting methods in the main blocks were broadcasting (irrigated with flat basin) , broadcasting (irrigated with furrow) , drilling (irrigated with flat basin) and row spacing on bed – furrow while four skipping irrigation treatments in the subplots were ; full irrigation (re irrigation when 50 % of available water was depleted) as a control , and another three treatments involving skipping only one irrigation (depletion about 85 – 90 % of available water) at either tillering , late booting and grain filling . The depletion of soil moisture was measured by gravimetric method .

The results indicates that water stress caused reduction in grain yield by 26 , 22 and 14 % in plant stressed at grain filling , tillering and late booting respectively . The planting in row spacing on bed – furrow given higher grain yield (6.92 t.ha-1) while other methods (drilling , furrow and broadcasting respectively 5.22 , 5.14 and 4.08 t.ha-1 . The highest value of water use efficiency (WUE) of barley grain was with row spacing on bed – furrow when stressed at late booting stages (2.38 kg m-3) and the lowest with broadcasting stressed of grain filling (1.16 kg m-3) skipping irrigation at tillering stages caused a significant reduction in plant height , flag leaf area and it's weight , spike weight number of tillers , biological yield and number of spikes .

There was a significant reduction in chlorophyll content , number of grain per spike at late booting stage treatment while skipping irrigation at grain filling caused a significant reduction in grain weight , biological yield and harvest index .

Planting in row spacing on bed – furrow improved the roots growth which was reflected in a good shoot growth and then a high grain yield.

The results showed that water stress at grain tillering stages had the most depressing effect on barley followed by at tillering and the row spacing on bed furrow is the best planting method for barley production .

Anderton Lucy
Economist, Department of Agriculture and Food, Australia
Ross Kingwell
Chief Economist, Professor, Australian Export Grains Innovation Centre, Australia
David Feldman
Senior Economist, Department of Agriculture and Food, Australia
Vilaphonh Xayavong
Economist, Department of Agriculture and Food, Australia
Jane Speijers
Biometrician, Private Consultant, Australia
Angela Wardell-Johnson
Social Scientist, University of the Sunshine Coast, Australia
&
Nazrul Islam
Senior Economist, Department of Agriculture and Food, Australia

The Impact of Climate Change and Adaptation Responses on the Success of Farm Businesses in Western Australia

This study examines ten years of financial and production data of 242 farm businesses operating in south-western Australia. It also identifies the behavioral characteristics of the farm operators through a comprehensive socio-managerial survey of each farm business.

The study area has a Mediterranean climate, where three quarters of the rainfall is received during the growing season from April and October. Growers have learned to produce 2 tonne per hectare wheat crops on less than 200 ml of growing season rainfall.

Australia is the driest continent in the world and is renowned for its climate variability. In addition, evidence is emerging that its southern parts, like south-western Australia, are experiencing a warming, drying trend in their climate. In the study region, average annual rainfall over the last thirty years in the study area has declined and average minimum and maximum temperatures have risen. Moreover, in the last ten years a number of droughts have occurred.

This multidisciplinary study examines the business performance of 242 farms from 2002 to 2011 and identifies the strategies farm managers have adopted to adapt to their dying, warming environment. Farms are categorised according to their performance and their characteristics, including socio-managerial characteristics, are compared and contrasted. We find many significant differences between farm performance categories and the adaptation strategies used by farmers

in those groups. There are also different socio-managerial characteristics of farmers in those groups.

Jana Apse
National Botanic Garden, Latvia
&
Aldis Karklins
Latvia University of Agriculture, Latvia

Influence of Soil Modification on Mineral Nutrition of Highbush Blueberries

Blueberry cultivation is becoming more and more popular in Latvia and several commercial plantations were established recently. Highbush blueberries (Vaccinium corymbosum L.) are perennial that can grow without replanting for 50 years, therefore a choice of soil and its preparation has a great role. This article summarizes results of research carried out in commercial blueberry plantation established in 2004 on loamy Haplic Cambisol. Soil reaction was determined potentiometrically, organic matter in mineral soil according to the Tyurin's method, in organic materials – by wet digestion, total nitrogen by the Kjeldahl method. Phosphorus and potassium in organic materials – by dry combustion, but in mineral soil – by Egner–Riehm method. Berry yield of 4 blueberry cultivars, soil properties and nitrogen, phosphorous and potassium content in growing plant leaves was determinate. Soil properties, especially reaction and organic matter content initially were not suitable for blueberry cultivation therefore deep tillage and application of soil conditioner (acid sphagnum peat) was done before planting and similar peat mulch was applied every second year. Obtained results showed that sphagnum peat is an effective material for lowering of soil pH in plant root layer (0 – 40 cm) and provides an optimal environment for blueberries. Soil was not the determinant factor that limits a productive establishment of blueberry plantation in Latvia. Soil properties adjusted accordingly to the requirements of highbush blueberry, gives a possibility to establish plantations also in typical mineral soils that has developed on low calcareous moraine.

Tala Awada
Professor, University of Nebraska, USA

Water Use in a 58 Year-Old Even-Aged Stand of Invasive Woody Juniperus Virginiana L. In the Nebarska Sandhills, USA

We investigated the intra-annual variability and environmental controls over transpiration (E) in a planted, even-aged (58 yrs; 537 trees ha-1), experimental forest of invasive native Juniperus virginiana in the Nebraska Sandhills, with three canopy classes (dominant, co-dominant, and suppressed) using sap flux techniques, in a year where drought was absent (2008, 34 % above average precipitation). Daily E was closely linked to growing-season length and variability in the environment. Minimum and average daily air temperatures, photosynthetically active radiation, and precipitation explained the majority of the intra-annual daily variability in E. Vapor pressure deficit was a significant factor in spring and summer, shallow volumetric soil water content (VSWC 0.2 m) was important during summer particularly June, and deep VSWC (0.6 m) was a significant factor in January and August. E was highest in the dominant trees and contributed to the majority (~ 77 %) of stand transpiration (Ec) on site due to their larger canopy size, greater tree density, more leaf area, and accessibility to water resources compared to the co-dominant and suppressed tree canopies which contributed to 16 and 7 % of E, respectively. Ec averaged ~ 413 mm yr-1, corresponding to ~ 24 % of potential evapotranspritaion. Soils were significantly drier in the J. virginiana stand than in adjacent C4-dominated grasslands, which could be due to the longer growing-season over which physiological activity extends in J. virginiana compared to C4-dominated grasslands in the region, and precipitation interception by the canopy and forest floor which evaporates before reaching the soil.

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Phylogenetic Screening for Antibiotic Producing Actinomycetes

In this study, we isolated Streptomyces from rhizospheric soils collected from Ngaka Modiri Molema district in South Africa. These isolates were screened for antibacterial activity against ten test microorganisms. Six isolates (NWU4, NWU91, NWU100, NWU110, NWU204, NWU339) which exhibited antibacterial activity against at least six of the test organisms were characterized by conventional and molecular methods. All the isolates exhibited broad spectrum of antibacterial activity against both Gram positive pathogens such as Staphylococcus aureus, Streptococcus pyogenes, Bacillus subtilis, B. cereus, and Enterococcus faecalis and Gram negative pathogens such as Shigella boydii, Klebsiella pneumoniae, Pseudomonas aeruginosa, Campylobacter jejuni and Proteus miribilis. The results showed that all the isolates were active against Bacillus subtilis, S. aureus, S. pyogenes and C. jejuni with a zone of inhibition ranging between 10 to 35 mm.

A 1.5 kb fragment of the 16S rRNA gene of all the six potent isolates was sequenced. The phylogenetic analysis of partial sequence confirmed that all the potent isolates formed closed phylogenetic cluster with known members of Streptomyces species with a (97-99%) sequence identity. The results suggest that Streptomyces in rhizospheric soils may represent a vast unexplored resource for biotechnology. These isolates may be capable of producing compounds of interest importance to medicine or agriculture. However, further investigation on the isolation and characterization of the antibacterial compounds produced will be necessary to ascertain if it is novel and/or of commercial value.

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Implications of CAP Reform for Greek Agriculture

The history of the Common Agricultural Policy (CAP) is a one of gradual but slow adjustment to developments in the EU and the rest of the world. Problems appearing in the course of the operation of the policy were mainly the result of delayed adjustment to conditions that necessitated immediate action and radical change.

The imminent CAP reform (2014-2020) faces new challenges, including loss of competitiveness of the European agricultural sector, greater world market volatility, deteriorating terms of trade, climate change and loss of biodiversity, other environmental pressures, and growing consumer and public concerns.

Commission proposals for CAP reform are currently being negotiated within the Council and the European Parliament. Key issues are how to strengthen competitiveness while securing environmental sustainability. The main changes proposed by the Commission include regionalization, "greening", promotion of innovation and best practices, enhancement of the farm advisory system, and risk management. Political challenges include convergence of payments between old and new Member States, capping, and the definition of active farmers for receipt of payments.

Greek agriculture has a poor record of performance under the CAP, despite a generous inflow of European funds for more than three decades. Failure to follow the rationale of the CAP and to communicate this to Greek farmers reflects weak institutions, a political system with an inherent aversion to change, and the lack of a strategy for the agricultural sector.

Greek agriculture is expected to play an important role in the country's economic recovery. This paper will examine the evolution of the CAP and the implications of the Commission's reform proposals with respect to Greek agriculture from both positive and normative perspectives. Since the extent to which the proposed reforms will be adopted is currently unclear, we also consider the implications of limited reform scenarios.

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Biological Activity Attributed to Tannins and Saponins in two Tropical Legumes

The most important inconvenience of the use of legumes in human nutrition is the content of anti-nutritional factors. Among them, tannins and saponins may cause a reduction in protein digestibility and bloating, respectively. Recently important biological activities were found, where tannins have an antioxidant activity and saponins may participate in the prevention of thrombotic cases. This information has being obtained basically working with temperate legumes. Tropical legumes have been poorly investigated. Therefore, the objective of this trial was to determine the biological activity of tannins and saponins in Vigna unguiculata (cowpea) and Mucuna pruriens in whole grains and in their fractions (hulls, dehulled kernels and protein concentrates). Samples were analyzed to estimate their content of antioxidant and antithrombotic activities. The variables were analyzed using descriptive statistics and by the GLM procedure to detect effects of the type of legume, the fraction studied and their interaction. The highest antioxidant activity was observed in Vigna (5093 Trolox equivalent units, TEAC) ($P<0.05$); as in the fractions, the highest concentration was found in hulls (5937 TEAC) ($P<0.05$). These values are considered high. The antithrombotic activity was similar in both legumes ($P>0.05$); the most abundant amount was found in dehulled kernels of both legumes ($P<0.05$). In all cases values of antithrombotic activity was considered low. No interaction was found between main factors. It is concluded that the content of tannins and saponins in Vigna unguiculata and Mucuna pruriens led to a high antioxidant activity, especially Vigna hulls; antithrombotic activity of dehulled kernels was also found in a lesser extent. These fractions may be useful in the development of functional foods.

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Effects of Different Fat Sources on Fatty Acid Composition and Cla Content of Eggs of Laying Hens

Effects of different fat sources on fatty acid composition and CLA contents of eggs of laying hens were investigated by gas chromatographic method. Total 30 different fatty acids were determined in fatty acid compositions of eggs. These fatty acids were varied between C 8 to C 22. When animal fats especially tallow fat added to ratios of laying hens, toplam CLA contents of eggs were significantly increased. CLA content of eggs analysed were found to be higher percentages in 90th day than those of 30th nd 60th day.

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Influence of Mycorrhiza Inoculation on Plant Growths of Triticale (x Triticosecale Wittmack) and Clover (Medicago sativa) in Sterile and non-Sterile Soils

A pot experiment was carried out to determine the effects of mycorrhiza inoculation on mycorrhizal infection, spore abundance as well as micronutrient contents of clover (Medicago sativa) and triticale (x Triticosecale Wittmack) plants. Clover and triticale was sown on sterile or non-sterile soils either with or without mycorrhiza spore applications.

Results revealed that root and shoot weights of clover and triticale were increased by mycorrhizal inoculation in both sterile and non-sterile conditions. The positive effect of mycorrhizal inoculation on biomass yield was considerable higher in sterile condition. Not surprisingly, mycorrhizal inoculation increased the mycorrhizal infection rate. However, the highest infection rate was observed in non-sterilized and non mycorrhiza applied variant as 86% at clover whereas the highest value in triticale was observed at -sterile +mycorrhiza application as 79%. Results related the nutrient contents of the both plants, represented the effectiveness of mycorrhiza. Therefore inoculation by mycorrhiza enhanced the plant nutrient uptake capability.

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Effects of Different Growing Mediums on Nutrient Concentration of Eggplant in Soilless Culture

Study was conducted to examine the relations among some iron related parameters such as plant growth, total and active iron, chlorophyll content and SPAD index in tomato leaf. For this, tomato seedlings were planted in perlite and watered with the nutrient solution containing 7.5 µmol/l (Fe1), 15 µmol/l (Fe2), 30 µmol/l (Fe3) and 60 µmol/l (Fe4) iron in growth chamber for two mounts. According to results, all parameters, except chlorophyll a, significantly affected by increasing levels of iron and examined parameters increased with iron levels. Also positive significant interactions were seen among the some parameters.

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Influence of Temperature and Residence Time of Main Liming Process on the Reduction of α-Amino Acids during Beet Juice Purification

During beet raw juice purification, an appreciable reduction in the content of α-amino acids results from destruction reactions, i.e. saponification of amides, which chiefly occur during the main liming process owing to alkaline conditions at elevated temperatures. Hence, from the point of view of optimum degradation conditions in main liming, the aim of this study was to investigate the influence of temperature (i.e. 80, 85 and 90˚C) and duration (i.e. 15, 25, 35 and 45 minutes) on α-amino acid degradation. In this research, the classical method was used to purify the beet raw juice. The α-nitrogen content of both raw and thin juices was measured using a Betalyser analysing system. In this study, invert sugar content of thin juices was also evaluated since reducing sugars not only give rise to formation of coloured and acid products during main liming process but also tend to react with amino acids to form browning products in technical juices. The resultant thin juices were concentrated in an atmospheric pressure evaporator until a brix of 60 was obtained. Limed juices heated at 80˚C exhibited larger α-amino nitrogen content than those at higher main liming temperatures and the greatest residual α-amino nitrogen content (13.14%) of the original level in raw juice was found at 80˚C and the minimum residence time (15 min). Higher temperatures and longer residence times of main liming decreased the residual α-amino nitrogen content, although they resulted in increased colour of thin juices. Nevertheless, these juices subsequently exhibited a lower colour formation in beet thick juice during evaporation compared with thin juices subjected to milder conditions of main liming.

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The Impact of Virtual Water Trading on the Water and Agricultural Policies in the Semi-arid Regions; The case study of Cyprus

Most Middle Eastern, North African, and Mediterranean countries are facing chronic and severe water shortage problems. Such problems are exacerbated by increasing populations and growing economic activity. Although many semi-arid countries have been taking a series of technical measures to safeguard their water supply such as building of reservoir dams and introducing new irrigation techniques, or to develop new water supply sources such as desalination and brackish water treatment, few countries are taking enough steps in curbing their water demand. Taking the island of Cyprus as a case study, this paper investigates the impact that virtual water trading can have on the water management and agricultural policies of such semi-arid countries. This study presents a complete fresh-water, including both natural and artificial sources, balance for Cyprus, examines various water saving techniques already implemented or proposed for the country, a virtual water trade map and finally it re-examines the water balance for the island while taking virtual water trade into account. The results of this study lead to various suggestions, including an increase of the net virtual water imports in Cyprus, different water allocation scenarios that connect the agricultural, domestic, industrial, and tourism sectors of the economy, while considering the respective economic and social benefits and costs for the country.

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Salmonella, Campylobacter, and E. coli: Farm trends and implications for raw dairy products consumption

In 1938 raw milk was responsible for 25% of all foodborne outbreaks in the U.S. Chicago passed the first milk pasteurization law in 1908. Between 1973 and 1992 raw milk-originated outbreaks were 2.4 yearly whereas between 1993 and 2006 they more than doubled (5.2). One of the largest raw milk-originated outbreaks of recent times happened in Pennsylvania in 2012. More than 71 cases of Campylobacter were confirmed in a four-state area. Ironically, the milk came from a farm called "The Family Cow" and was sold by a store named the "Healthy Grocer". Campylobacter is a common inhabitant of the intestine of the cow and other animal species, not a haphazard event. The U.S. Animal Health Monitoring System has determined that 92.6% of the dairies and 33.7% of the cows are positive to this pathogen. Producers unaware of milk pathogens are two-fold more likely to drink raw milk. Primary factors cited were taste (72%) and convenience (60%). A European Union Commission Regulation of July 2010 laid down the particular veterinary certification requirements for raw milk and dairy products destined for human consumption. Regulations and policies have protected the consumers' from diseases that can be transmitted through raw dairy products. This fact has created a partnership of trust among producers, industry, and consumers, that if broken can take a long time to be reinstated. This presentation will address the current raw milk bacteriological status with special emphasis place on Salmonella, E. coli, and Campylobacter and its implications for raw dairy products consumption.

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Testing of Mechanical Properties of Thermoplastic Starch (TPS) Films

The serious environmental pollution due to the usage of packaging materials made from synthetic polymers and plastic materials encourages producers to look for environmental friendly solutions. Thermoplastic starch is one of the most promising fully biodegradable raw materials for production of elastic and rigid packaging. However to use this material they must meet the requirements of clients and producers as regard e. g. static, dynamic, creep and stress relaxation strengths and other mechanical properties.

This paper presents and discusses the study of mechanical tests to investigate the TPS films. There were applied tensile, stress relaxation and creep as well as special designed cyclic force and impact tests. In all kinds of tests, the time-force response curves were recorded. From the tensile test, the critical values of tensile stress, yield stress and elastic modulus were obtained. Coefficients of elasticity and viscosity of generalised Maxwell model were obtained as a result of stress relaxation and creep test. Thermoplastic film resistance to cyclic loading was achieved as a result of cyclic force test. Loading used in this test was a combination of ramp step and sine function of the force acting on the sample for 60 seconds.

Impact test consist in the drop of the spherical impactor on the film sample fixed in a rectangular frame which ensures appropriate pressing the fixing force. The aim of this test was to obtain sample breaking stress. The influence of drop height and a diameter of the impactor on the kind of sample bursting was also studied.

Thermoplastic films were prepared by the extrusion cooking method from the potato starch granulate.

In order to study the influence the additives on mechanical properties of thermoplastic starch film two sets of samples witch polymer alcohol (5%), and keratin (0.5%) were investigated.

The results presented in the form of graphs and tables were discussed.

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Using a New Integrated Model to Assess the Effects of Thinning and Prescribed Fire on Pinus Palustris Carbon Sequestration

From an ecologic, economic and social point of view, Pinus taeda and Pinus elliottii are the most important tree species in SE United States, accounting for more than 13 million hectares planted. About 58% of the total U.S. timber harvest is from the SE U.S., making this region one of the most prolific timber production zones in the world. Because of their large area and high productivity, southern forests are a significant portion of the U.S. carbon budget, containing 12 Pg of C, 36% of the sequestered forest carbon (C) in the conterminous U.S. Climate change will likely have important impacts on managed southern pine systems. Some future climate scenarios predict, by end of the century, a rising in average temperature of 2.5 to 5^{o}. Precipitation predictions indicate that summertime precipitation will decline by 10% to 30%. In addition, elevated temperatures will increase vapor pressure deficits, making it likely that soil water deficits will become more common. All of these factors will likely negatively impact southern pine C sequestration. The stand-level C balance model 3-PG was parameterized for both species and used to predict forest productivity under changing management and environmental conditions for representative sites in SE U.S. Future climate scenarios were obtained from regional future monthly mean temperature and total precipitation scenarios obtained from the National Center for Atmospheric Research GIS Climate Change Scenarios.

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Evolution Patterns of Western Himalayan Artemisia L. (Asteraceae)

Westren Himilyan region of the world hosts rich biodiversity including 42 species of genus *Artemisia* (Asteraceae). Current study reveals the evolution patterns of this economically important vegetation. For its phylogeny, the data obtained, covered morphology, leaf epidermal anatomy, palynology and Phytogeography. Above all, additional support to study was given by molecular phylogeny. 52 morphological characters of 42 taxa were selected for phylogenetic analysis of the genus and the resulted cladogram validated *Artemisia* as a monophyletic assemblage. Our data analysis envisages that the *Seriphidium* clade somehow over the years, under different climatic condition has evolved from *Artemisia*. Therefore, it is contended that it can be treated as a section of *Artemisia* instead of a separate genus. Micromorphology in 24 taxa was studied using light microscopy (LM) and scanning electron microscopy (SEM). The glandular and nonglandular trichomes are classified into 16 main types along with six stomata types. This study suggests that leaf epidermal features are valuable taxonomic and evolutionary traits. The palynological study of 22 taxa was completed by LM and SEM. Eight characters of pollen grains were subjected to analysis. The phylogeny of pollen traits is indicative of evolutionary associations among four classical sections of the *Artemisia* and confirms the reunion of genus *Seriphidum* with *Artemisia*. The molecular studies using internally transcribed spacer (ITS) and externally transcribed spacer (ETS) sequences of nuclear ribosomal deoxyribonucleic acid (nrDNA) were conducted to know the phylogeny of 26 local species. The molecular data has verified first time that western Himalayan *Artemisia* species are the distant migrants from the neighboring areas. Current research further confirms the phylogenetic relationships of *Seriphidium* with *Artemisia* which has established in the evolution of both. Therefore, genus *Seriphidium* must be considered as a section of genus *Artemisia*. This research also has revealed that section *Artemisia* is polyphyletic in origin.

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Parasitic Nematodes Associated with Tropical Crops and Alternative Control Studies in the North and Atlantic Region in Costa Rica

The development of nematodes in agroecosystems can be regarded as a variety of interactions between the host population and the nematode, influenced by environmental factors and cultural practices. Models of population dynamics of nematode help formalize and quantify the possibly control of these interactions.

During the years 2008-2012 numerous samplings were applied to tropical crops such as rice, bananas, banana plantain, roots and tubers (yam, taro, potato and cassava), melon, tomato and coffee, in the Northern and Huetar Atlantic regions of Costa Rica, determining population dynamics, mathematical models and microorganisms associated with these parasitic. These samplings intended to seek alternative options to control chemical nematicides.

The most important nematodes found in crops under conditions of Costa Rica were Pratylenchus spp, Meloidogyne spp, Helicotylenchus spp, Tylenchorhynchus spp, Tylenchus spp, Paratylenchus spp , Heterodera spp, Xiphinema spp, Aphelenchoides spp, Criconemoides spp, Tylenchorhynchus spp, Paratylenchus spp, Hoplolaimus spp, and free-living nematodes due to the high content of organic matter and microorganisms in the soil.

Microorganisms which may be used as biological control associated with these parasites found in the soil, correpond to: Trichoderma spp, Gliocadium spp, Paecilomyces spp, Penicillium spp, Gongronella spp, Fusarium spp, Metarhizium spp, Beauveria spp, Streptomyces spp, Arthrobotrys spp.

Other tests have been conducted in the laboratory and research in the greenhouse at all fungi found is in progress. Some nematodes were subjected to natural extracts derived from plants of the region. On the other hand, generating promising results “in vitro” or at laboratory level succeed to determine the pathogenicity of fungi found is in progress.

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Evaluation of Drought Tolerance in Bread Wheat (Triticum Aestivum L.) Via in Vitro Conditions

In order to evaluate the response of twenty genotypes of bread wheat (Triticum aestivum L.) to callus induction and in vitro drought stress. A completely randomized design (CRD) with six replications was used for callus induction and a 20 × 2 factorial experiment based on CRD design with three replications was carried out for response of genotypes to in vitro drought stress. Analysis of variance revealed high significant differences ($P<0.01$) between genotypes for callus relative growth (CRG), callus relative growth rate (CRGR), callus growth rate (CGR), percentage of callus chlorosis (PCCH) and percentage of callus water content (PCWC) at different drought levels indicating the presence of genetic variability, different responses of genotypes to different drought intensities and in vitro selection of drought-tolerant genotypes using immature embryos. The stress × genotype (G × S) interaction was significant for CRG, CGR, PCCH and PCWC except for CRGR displaying different responses of characters to different levels of drought (PEG), while CRGR was stable and independent of different drought levels. Mean comparison for the effect of different stress (PEG) levels indicated that the effect of stress levels on CRG, CGR, PCWC and in vitro tolerance (INTOL) were decreased with increment of drought percentage. Mean comparisons between genotypes indicated that maximum CRG, CGR, CRGR, PCWG, PCCH and INTOL were attributed to genotypes 5, 16, 17, 2, 3 and 20 (drought tolerant), respectively. While the lowest amount of CRG, CGR, CRGR, PCWC, PCCH and INTOL were belonged to genotypes 13, 10, 15, 4, 15 and 15 (drought sensitive), respectively. Screening drought tolerant genotypes and in vitro indicators of drought tolerance using biplot analysis and rank sum, discriminated genotypes 6, 16, and 5 as the most drought tolerant genotypes, repectively. While genotypes 15, 17 and 10 as the most sensitive to drought, therefore they are recommended for crossing and genetic analysis of drought tolerance using diallel mating design or generation mean analysis and also for the QTLs (quantitative trait loci) mapping and marker assisted selection.

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Bio-diversity of Bacillus Megaterium as a Brilliant Bacterium for Human Life

Bacillus megaterium is a spore-forming bacterium showing the unusual ability to produce enzymes and proteins which has very wide usage in industry, agriculture, bioremediation and pharmacology. This work was performed to study the Isolation Bacillus genus and biochemical Identification of B. megaterium and it`s ecological distribution from some Iranian soils and also introducing soil as a strength source of this bacterium. Using a standard isolation method with specific medium, B. megaterium was isolated from all out of 30 soil samples collected in the Soil and Water Research Institute (SWRI) of Iran. The bacillus population percentage mean of samples` total bacteria population was (44.44%) and B.megaterium population percentage mean of total bacteria population was 19.64%. And also B.megaterium population percentage mean of total bacillus population was 26.17%. Maximum and minimum B.megaterium population logarithms were 5.71and 3.52for sample number 762 and 7775, respectively. Using Muller Hilton agar for total bacteria population and Hicrome Bacillus Agar for bacillus genus population and then biochemical Identification of bacillus isolates showed a great biodiversity among soil samples, which were distributed among different species, including subtilis, polymixa and cereus etc. As well the correlations between B.megaterium population and soil chemical and physical properties were studied. We found variable percentages of B.megaterium isolates among soil samples and knew about soil as a valuable source of this bacterium to use in bio fertilizers, bioremediation, biotechnology, soil aggregates bio flocculation, food industry and leather industry.

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Antimicrobial Activity of Bacillus Spp. in the Biocontrol of Different Phytopathogenic Agrobacterium Isolates

The genus *Agrobacterium* consists of Gram-negative, soil-borne bacteria, both pathogenic and non-pathogenic for plants. Pathogenic strains include bacteria causing crown gall and hairy-roots diseases. Crown gall disease could cause fatal infection of young plants, and it is related to reduction in crop yield. Disease management in fruit crops worldwide is heavily dependent upon the application of synthetic fungicides for pathogen control. The use of microorganisms as biological control agents may represent an alternative method to control phytopathogenic bacteria. In this study we tested the antagonistic effect of *Bacillus* spp. on *Agrobacterium* isolates originated from sour cherry, plum, blackberry, and grapevine.

The bacteria were isolated from collected samples of diseased sour cherry, plum, blackberry, and grapevine plants using young galls. Pathogenicity of the strains isolated from tumors was tested on sterilized and aseptically cut carrot disks by inoculation with bacterial suspension. The presence of galls was checked after four weeks. Different *Bacillus* spp. strains were tested for the production of compounds inhibitory to *Agrobacterium* strains using *In vitro* bioassay. A strain was scored positive if a clear inhibiton zone of at least 2 mm in diameter was observed.

Agrobacterium spp. were diagnosed as a pathogens of sour cherry, plum, blackberry, and grapevine using conventional methods based on the isolation on selective media, followed by pathogenicity tests on carrot disks. In vitro tests all of *Bacillus* spp. strains showed their antibacterial activity against different *Agrobacterium* isolates.

This study showed that *Bacillus* spp. Strains have potential as a agent in control of *Agrobacterium* spp.

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Strategic Assessment and Restoration Approach for Mangrove Ecosystem in Vietnam

We have tried on strategic assessment to detect potential mangrove restoration sites based on remote sensing and GIS on shrimp farming area in northern Vietnam. The various ecological services of mangrove wetland which include 1) conservation of biodiversity, 2) stable supply of fisheries resources and wood, 3)filtering effect on sediment run-off, 4)risk reduction of natural hazards (ex. Tsunami), 5)buffer to reduce the effects of ocean waves and currents on estuaries have been re-realized.

Since the 1980s in Vietnam however, mangrove wetland and its ecosystem are critically endangered by rapidly increasing of shrimp aquaculture industry and deforestation. In recent years, furthermore, mangrove wetland is pointed out as most vulnerable ecosystem to sea level rise by climate change.

On the other hand, present shrimp farming system is very difficult to keep sustainable management. As a result, abundant shrimp ponds those are economically inefficient are increasing.

Our study area is Quảng Ninh province that is located along the northeastern coast of Vietnam. In the Dong Rui region we focused, shrimp ponds construction was started from an early stage in 1980s. So some shrimp ponds have finished their cultivate activity already. The main plant mangrove species are (Kandelia obovata), Red mangrove (rhizophora stylosa) and Black mangrove (Bruguiera gymnoritza).

The objective of our research is to support nature restoration of mangrove ecosystem by tree-planting program on abundant aquaculture ponds.

The objectives of our study focused on mangrove restoration are next three.

GIS database construction of present shrimp ponds using high resolution satellite data (IKONOS etc.).

A detection of potential mangrove area based on image analysis between Landsat MSS data and 1/50,000 land-use map in 1960s

Final evaluation of target mangrove restoration sites that integrated result of 1) and 2) into consensus building of stake holders.

Through this process, we highly developed the analysis between satellite images and spatio-temporal data. To detect original mangrove zone using remote sensing, ISO Unsupervised Classification (Supervised Classification in sub-process) to MSS image (Landsat_1, 29-Dec-1973, Path 135, Row 045) and interpretation of past land-use map was done.

In according with these steps, we assessed some proposed sites for mangrove restoration in Northern Vietnam.

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Periphyton Community Dynamics at Lake Couchiching, Orillia, Ontario: Influence of Water Depth

Periphyton community development is a function of biological and physical properties of water column. Their development and species composition have been used as indicators of water quality by many workers. However, studies on periphyton development from temperate freshwater systems are sparse. In this study, periphyton community development and its variation with depth were studied at Lake Couchiching, a perennial lake in Orillia, Ontario, Canada, during fall 2012. Clean glass slides (10x3x0.3 cm) were suspended with the help of wooden rigs at two depths at the Port of Orillia, one just below the water surface and the other at ~2m depth (just above the bottom). Replicate glass slides were removed at fixed time intervals (1,3,5,10,15,20,25 and 30 days after slide exposure) for a maximum duration of 30 days. The parameters monitored include microalgal species composition (especially diatoms), density, biomass, biofilm thickness and protozoan grazers. Water parameters such as temperature, pH, conductivity, dissolved oxygen, chlorophyll a, nutrients such as total phosphorus, nitrate and nitrite, and total suspended load were monitored on each sampling day. While the lowest number of species was observed in the surface sample on day 1 with only 8 species, the highest number of species was observed on day 20 in the bottom sample with 24 species. Biofilm thickness increased continuously up to day 20 and then decreased. The density of diatoms on glass slides also exhibited a similar trend, a gradual increase up to day 20 in the bottom sample and then decreased to day 30. Thus, this study showed the influence of water depth, light penetration and water parameters on the periphyton community development. A definite relationship between the periphyton parameters and water quality in the area collected over a prolonged time interval could help us to design a periphyton based water quality index for this area.

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Climate Change Adaptation Measures in the Sectors of Agriculture, Water and Nature Management-A Review for Cool Temperate Regions

Land managers' capacity to implement autonomous adaptation strategies is largely dependent on access to resources and the possession of skills and knowledge. Given that climate change will increase the rate, scale and magnitude of climatic uncertainty, it is important to a) identify adaptation strategies that will reduce the negative impacts of climate change and exploit the opportunities arising from it in different regions and b) make this knowledge available to land managers and policy makers in order to minimise the potential for mal-adaptation. To contribute to this aim, we conducted a systematic review of the literature on adaptation measures that are already or likely to be applied in cool temperate regions. Systematic reviews offer a transparent and comparable method for literature searches. The scope of the review included the sectors of agriculture, water and nature management. The five capitals (i.e. human, social, manufactured, natural and economic capital) were used as a framework to classify the identified measures. This classification allowed a sectoral and cross-sectoral comparison of the adaptation measures, and the identification of trade-off and synergy situations. This information can contribute to the holistic enhancement of the capacity of socio-ecological systems to adapt to climate changes.

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Examining The Influence of Psychological Factors on Global Climate Change Perceptions Held by Farmers in the Northeast of Thailand

Global climate change is considered one of the clearest manifestations of socio-ecological challenges of the 21st century. Several extreme weather events have increased in Thailand and in other parts of the world. In most cases, climatic variability has always been associated with agricultural dimension. To date, however, there is inconclusive evidence to support the understanding of farmers' capacity to detect climate change and its potential impact. Thus, from this perspective, this paper aims to understand how global climate change was perceived by Thai local farmers and, further, to examine the influence of psychological factors on their perceptions. It drew upon the combination of mixed research methods from both qualitative and quantitative approaches. Questionnaires were distributed to 70 randomly selected agricultural households in Village 4 of the Nongbuasala sub district, Nakorn Ratchasima, Thailand. Survey results found that the majority of respondents view climate change as an extreme high temperatures and flooding. Regression analysis also indicated that there were positive correlations between the perceptions of climate change and six psychological variables of awareness in general and mitigation, belief in reality of climate change and human causes, the feelings of worry, and self-efficacy ($.111 \leq r \leq .538$; $p<0.05$). Conversely, regarding the perceived barriers, three components of cognitive dissonance ($r = -.831$), belief in limitation of lifestyle changes ($r = -.305$), and fear ($r = -.283$) were found to be negatively correlated with climate change perceptions by Thai local farmer. Further recommendations to deal with those perceived barriers were also discussed.

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Analysis of Merapi Mount's Post-Eruption Soil and Volcanic Deposit Amended with Organic Matter and Mulch on Manihot Esculenta C. Growth

Agricultural lands were covered with pyroclastic and volcanic material deposits during Merapi Mount eruption at October to November, 2010. Those volcanic deposits contain nutrients which potentially increase soil fertility. But, their existences on different radius (distance from mount's peak) are varies, hence it is necessary to study their properties. This research was aimed at determining the physical and chemical properties of volcanic deposits amended with organic material and mulch and the effects on cassava's (Manihot esculenta C.) growth. A completely randomized factorial design was conducted in the three levels of planting media (soil, sand and volcanic ash taken from Kaliadem, Kopeng dan Karanglo), two levels of organic material using fine compost, and two levels of organic mulch. The analysis included physical and chemical properties of planting media (initial and final), also crop observations included vegetative growth, root, stem and leaf weight. The results showed that the physical and chemical characteristics of the soils and volcanic deposits were different. The synergetic interaction between organic material and organic mulch with planting media resulted in better moisture content of 2 mm, available water, silt percentage, organic matter content, leaf number, the dry weight of roots, stems, and leaves at planting media from all locations.

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Spatial Heterogeneity in Periphyton Colonization: Edge Effect a Myth or Reality?

Heterogeneity in the colonization of periphytons on substratum surfaces exposed to freshwater habitats is not well understood. The development of periphyton community on substratum surfaces put in freshwater habitat is thought to be influenced by factors such as biological (initial colonizers, bacterial population, competition, predation etc.) and physical (nature of the substratum surface, water current pattern etc.) acting on the surface and the availability of propagules in the water column.

In this study we have investigated the variation in colonization pattern of microalgae, especially diatoms (Bacillariophyta), on inert glass surfaces (10x3x0.1cm) suspended in the littoral zone of Lake Simcoe, near Orillia, Ontario, Canada for a maximum period of 30 days with intermittent sampling (5 day interval). The retrieved replicate slides were observed under a microscope for species composition, microalgal density and biofilm thickness measurements along the edges and centre. We hypothesized that the centre of glass slides would have a higher species density and diversity and contain more loosely attached diatoms than the edges because of the variation in micro currents between these two locations on the same surface. The observations were made from fifteen (15) predetermined viewing points on each slide, six along the edges and nine from the centre.

Results indicated that the microalgal colonization pattern vary between centre and edges. Biofilm thickness was significantly higher at the centre than at the edges. More number of loosely attached and motile diatoms (e.g. Amphora ovalis, Gyrosigma acuminatum) was found at the centre of the glass slides, which along with a thicker biofilm and lower species diversity indicated an advanced successional stage of biofilm development than that was observed at the edges. The lower biofilm thickness combined with higher species diversity and increased number of firmly attached diatom species (attached at the valve face e.g. Cocconeis placentula) indicated an early successional stage of periphyton community development at the edges. Therefore, these study results did not fully support the hypothesis tested, which was also reported earlier by Sekar et al (1997). A study involving

microcurrent measurement at the surface and collecting data on the predation and competition would prove beneficial in understanding the heterogeneity of periphytons on substratum surfaces exposed to natural aquatic habitats.

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Comparison of Nitrogen Use Efficiency of Agroforestry, Organic, and Conventional Farming Systems

The increasing world population leads to higher food demand. Improving resource use efficiency of farming systems could be one of the solutions to this situation. In this study, the nitrogen use efficiency (NUE, N output / N input) of four farming systems (organic farming, conventional farming, organic agroforestry, and conventional agroforestry) was analyzed. Experiments were done in the experimental farm Scheyern, whichlocated in southern Germany, 500 m asl in a hilly landscape. The organic crop rotation was grass-clover-alfalfa (GCA) – potato – wheat – sunflower – GCA – wheat - rye, the conventional crop rotation was maize – wheat – potato - wheat. Tree species of the forestry subsystem were poplar, willow, black locust, and alder.

Results showed that the organic farming and both the organic as well as the conventional forestry were low input systems with 87, 78, and 84 kg N ha-1 yr-1 input, respectively. The conventional farming was a high input system with an input of 199 kg N ha-1 yr-1. However, organic farming was also a low output system having a yield of only 2.5 ton DM ha-1 yr-1 (N output 45 kg N ha-1 yr-1) while conventional farming had a yield of 10.1 ton DM ha-1 yr-1 (N output 171 kg N ha-1 yr-1). This was low even compared to the previous survey (Küstermann et al., 2010) and was due to the GCA in organic crop rotation, which was not harvested but used as green manure to improve soil fertility and to offer N for the following crops. The yield of organic and conventional forestry subsystem was 8.5 and 7.6 ton DM ha-1 yr-1, respectively. The NUE was calculated with consideration of soil organic nitrogen depletion or accumulation (Δ SON). The NUE of organic and conventional farming was 0.7 and 0.8, whereas the organic and conventional forestry subsystem had a better NUE of 0.9. With this, the N surplus (N loss potential) of the forestry subsystems was much lower

(organic: 1 kg N ha-1 yr-1, conventional: 2 kg N ha-1 yr-1) compared to the farming systems (organic: 22 kg N ha-1 yr-1, conventional: 48 kg N ha-1 yr-1). The NUE of organic and conventional agroforestry became 0.7 and 0.8, and N surplus became 18 and 36 kg N ha-1 yr-1, respectively.

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Crop Architecture: Investigating 'Strigolactones' A New Plant Hormone Present In Branching and Non-Branching Varieties of Some Horticultural Species

Crop architecture, which is important for crop productivity, is mainly determined by shoot branching. Recently, a new hormone has been postulated as being a strigolactone-type compound that controls shoot branching. Strigolactones in branching and non-branching varieties of some horticultural species were investigated using a specific germination assay based on the parasitic weed seed Orobanche minor, which requires strigolactones for its germination. Strigolactones were found in all horticultural crop species studied but not in all varieties within the species. Branching varieties showed little or no strigolactone suggesting that strigolactones may influence branching inhibition. In Zantedeschia, a commercially important cut flower, a good correlation between strigolactone content and branching was observed during the early vegetative phase but not in other phases: the branching variety also produced high levels of strigolactones in later growth stages. As there are many different strigolactones a specific branching assay is being developed, in addition to physico-chemical methods like mass spectrometry, in order to identify the strigolactone or related compound responsible for branching inhibition. Production of strigolactones in later stages of development also indicates that strigolactones may have other physiological roles.

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A Sustainable Model for Producing the Yearly Vegetable and Fruit Needs for a Family in their Home Landscape

The objective of this research garden was to evaluate if raised bed gardening of vegetables and fruit and the inclusion of fruiting trees, bushes, and vines can produce a sufficient amount of food servings for a family of four for a year in the home landscape. The experimental home

food production garden consisted of four 0.9 m by 12 m raised beds filled with a commercially available friable soil composed of sand and organic matter. Additional food servings would be provided by 10 fruit trees, 8 blueberry bushes, and grapes and muscadines on an arbor. The four raised beds produced 4230 food servings for the year, and the fruiting trees, bushes, and vines would produce 3200 food servings for a total of 7430 food servings for the year. This is more than enough to provide 5 vegetable and fruit servings per day for a family of 4.

As a part of food garden management and keeping soil ideal for food production, composted leaves and pine straw along with garden plant matter was regularly converted into finished compost and 2 inches was added around garden transplants and emerging seedlings in the spring, summer, and fall gardens. In the Southeastern United States hot-humid climate zone, three food gardens can be planted per year. The seasonal addition of compost maintained an ideal

soil texture and produced other beneficial soil properties in addition to keeping yard waste out of the community waste stream.

It was concluded that the area of the four raised beds, and the fruiting trees, bushes and vines were able to produce more than 100% of the vegetables and fruit needed by the family for a year in a food garden that would fit into a home landscape design.

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Black Carbon and Gases from Biomass burning in Mexico

Biomass burning represents an important source of atmospheric black carbon and greenhouse gases which contribute to global warming. Every year, more than 1,000 forest fires are reported in the surrounding of Mexico City during the dry season, in addition, there is a practice of burning the agriculture wastes. These fires and biomass burning contribute not only to the air pollution of this megacity, but also to the production of chemical species which increase of radiative force in the atmosphere. For assessing the environmental impact, it is necessary the generation of reliable inventories due to burning biomass around the city. In this work, a burning device consisting of a container with a table and an inverted funnel-like steel hood with a 3 m chimney was built in order to determine the emission factors under controlled laboratory conditions from different types of burning biomass such as corn crops wastes, vegetable wastes, dry pine leaves, wood, among others. The apparatus employed was placed on a balance that registered the mass loss and the aerosol and effluent gases were measured with an isokinetic device; and several emission factors of CO2, CO, particles and black carbon were determined. These factors can be applied during the application of air quality models and for more consistent emission inventories of Mexico City and other cities which have similar biomass.

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Plant Acclimation to Elevated CO2: Impacts on Multitrophic Interactions with Insects

Elevated concentrations of atmospheric carbon dioxide (CO2), a consequence of anthropogenic global change, may profoundly interfere with tritrophic interactions, involving plants and insects, what has rarely been investigated. This contribution provides a synopsis of the key findings from our recent experiments in an agricultural system comprised of a Brassica plant, a specialist insect herbivore (the cabbage aphid) and its parasitoid. We investigated how plants might acclimate to elevated CO2 and how both herbivore and natural antagonist might respond to CO2-mediated changes in plant characteristics, including chemical traits. Our findings indicate that plant acclimation to elevated CO2 resulted in changes in plant growth-related characteristics, particularly size and biomass. Whereas there was no significant change in primary metabolites (carbon and nitrogen), we detected a decrease in volatile emission and an increase in secondary metabolites, specifically in the defense-related glucosinolates. The colonization ability and the performance of the aphid (development time, fecundity and body mass) were impaired when grown on CO2-acclimated plants. Similarly, the performance and efficiency of the parasitoid was impaired under elevated CO2. As plant secondary metabolites play an important role in plant-insect interactions, due to their defensive function, the increase in plant glucosinolates and the decrease in plant volatile emission may have been the driving force behind the changes in herbivore insect behavior and performance under elevated CO2. The CO2-effect on the parasitoid is likely related to a decrease in host quality, particularly in body mass, caused by the CO2-mediated alterations in plant chemistry. Our results illustrate how CO2-mediated changes in plant characteristics might enhance plant direct defense by decreasing herbivore performance. However, it might also lead to a reduction in plant indirect defense, by decreasing parasitoid performance and efficiency. A conflict between bottom-up and top-down herbivore control under elevated CO2 is here shown for the first time.

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Universality, Urbe and University: A Transversal Environmental Thematic

It is urgent and unavoidable addressing environmental issues in various areas of education, from pre-school, elementary school, high school, undergraduate and graduate, that is, on all levels. Only then society will be able to transform the existing actions that degrade the strikingly natural resources and the environment.
The lack of knowledge of the environmental area is huge and growing mainly in academia.
Due to the recent perception by some sectors of society urgency of addressing the complex challenges that exist in this area is essentially multidisciplinary university that has great importance regarding the processing capacity of the existing values that are promoting and expanding environmental problems.
It is increasingly urgent to increase teacher knowledge about this theme as well as the creativity and dynamism in dealing with students in the classroom.
Environmental issues are systemic in nature and there is no separate disciplinary knowledge, because it comes from many different factors, multidimensional. Can and should be addressed in different disciplines, even if the term environmental (or relative) does not appear to directly and explicitly in the syllabus. It is up to the educator to identify the contents of each field of knowledge regarding environmental implied, motivating and interactively with students performing links. This encourages groups and creates new possibilities for the development of critical thinking and participatory. Within this process, groups of students can pass to perceive more clearly how social participation dimension that includes each society. Finally, we emphasize that the social sciences discipline to be intercourse, is present in all courses of private university. Hence another important choice in the discipline, to be comprehensive, there is the potential to achieve different natural formations. Thus, the constructive suggestions can be constituted by origin, transverse and interdisciplinary.

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General Status of Mushroom Production Buildings and View of the Neighboring Families Mushroom Production Buildings – The Case of Korkuteli

In this study, the current situation of enterprises engaged in mushroom farming which damages the environment and production building, mushroom production facilities of the manufacturer's view of families and the neighboring state of health effects have been studied in Korkuteli district of Antalya Province. For this purpose, mushroom farming of the 134 enterprises were selected which is also to determine the effects of production facilities neighboring to these enterprises. Korkuteli is mushroom cultivation and compost production center of Turkey's cultural state. Approximately 50% of fresh mushroom production in Turkey and more than 50% the production of compost takes place in Korkuteli. Result of this research, 70.1% of the farmers', they think that cultivation of mushrooms any harm the building. Vast majority of producers reported that any illness undergone after the start of production. Business owners said they are suffering from leg and arm pain due to the fact that constantly working with humid environment. In a survey study of the neighboring families, 59.7% of people think that the facilities are not damage themselves. Adjacent to the damaged from facilities 73.1% of families' said they are uncomfortable odor emitted from the production facility.

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SEBAL Methodology for Estimating Crop Evapotranspiration in Cyprus

Water allocation to crops has always been of great importance in agricultural process. In this context, and under the current conditions, where Cyprus is facing a severe drought the last five years, purpose of this study is basically to estimate the needed crop water requirements for supporting irrigation management and monitoring irrigation on a systematic basis for Cyprus using remote sensing techniques. The use of satellite images supported by ground measurements has provided quite accurate results. Intended purpose of this paper is to estimate the Evapotranspiration (ET) of specific crops which is the basis for irrigation scheduling and establish a procedure for monitoring and managing irrigation water over Cyprus, using remotely sensed data from Landsat TM/ ETM+ and a sound methodology used worldwide, the Surface Energy Balance Algorithm for Land (SEBAL).

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Precision Fertigation for Sustainable Agriculture in Saudi Arabia

Agriculture in Saudi Arabia is dependent on finite water resources. Efficient use of depleting water resources is a dire necessity to attain sustainability. Precision fertigation technology helps in optimizing input use in agricultural activities. Investigations were carried out to study the response of crops such as wheat, alflalfa and Rhodes grass to precision fertigation. Proximal and Remote Sensing technologies were used in monitoring the performance of the test crops. ASTER satellite imagery was used to determine the spatial variability in crops. Ground truth data on NDVI and LAI were collected and regressed against NDVI derived from satellite images. The models that have been developed can be used for developing site specific irrigation and fertilizer recommendations under similar conditions. Results of the studies have indicated that it is possible to save 20 to 30 per cent of water used in the production of these crops without sacrificing the yield. The findings of these studies on precision fertigation in wheat, alfalfa and Rhodes grass will be presented in the conference.

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Exploration of Genetic Variability of 'Mirasol' Chili (Capsicum Annum L.) Accessions Through ISSR Markers

Chili is an important crop that has not been subjected to intensive breeding; therefore, there are not enough outstanding improved varieties available for producers. Then, exploration of genetic variability available for this crop results a valuable approach to identify useful materials that could enrich genetic diversity of the existing breeding programs. In this study, 30 chili landraces collected from two Mexican provinces were evaluated in order to estimate genetic diversity among them through their genomic fingerprints obtained from ISSR (Inter Simple Sequence Repeat) markers. Nine ISSR primers produced a total of 51 bands, and 43 of them were polymorphic (representing 84.3 percentage of polymorphism). UBC841, LOL12, and LOL10 primers showed high polymorphic information content, and therefore they could be very useful in further genetic studies in this crop. Gower's distances between pairs of accessions were used to define four groups according to their molecular diversity. The results obtained from this study proved the existence of important genetic variability among chili landraces collected at distinct geographical locations, and allow establishing the basis for conservation and utilization of evaluated materials for breeding purposes. ISSR molecular markers were able to differentiate genetically chili accessions even though their expected high genetic homogeneity due to its self pollination nature.

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Copper-Citrate as a Possibility for Control of Some Phytopathogenic Bacteria

Copper citrate is a complex compound of copper, which is characterized by a high degree of dissociation in relation to other copper compounds that have applied so far and can be used in lower concentration. This compound had no toxic effects on fish, birds, mammals and bees in his introduction of the application and can be used as a environmentally acceptable agent in plant protection. The aim of this study was to evaluate the effectiveness of copper-citrate applied to six economically important plant pathogenic bacteria.

Agar diffusion disk method has been used in the determination of Growth Inhibition Pathogens and the Minimum Inhibitory Concentration. Dilution series of copper-citrate was prepared from the initial concentration of 1% to 0.01% from the end. In this study we tested efficiency of copper-citrate on the following pathogenic bacteria: *Erwinia amylovora*, *Pseudomonas syringae* pv. *syringae*, *Pseudomonas savastanoi* pv. *phaseolicola*, *Xanthomonas campestris* pv. *campestris*, *Xanthomonas axonopodis* pv. *phaseoli* and *Xanthomonas campestris* pv. *vesicatoria.*

Obtained results showed that the copper-citrate had bactericidal effect to all tested bacteria. Tested concentrations of 0.5-1% formed inhibition zone around the diameter of 15 mm, a concentration of 0.07-0.4% zone diameter of about 10 mm. Concentrations that are not inhibited colony growth in tested isolates were ≤ 0.06%.

Based on these results, we can conclude that the copper-citrate can be used as an effective agent for control of plant pathogenic bacteria.

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Drinking Water Distribution Systems Characteristics on Biofilm Development: A Kernel Based Approach

Biofilms develop in drinking water distribution systems (DWDSs) as layers of microorganisms bound by an organic matrix and attached to pipe walls. The presence of substantial and active attached biomass can lead to a decrease in water quality by generating bad tastes and odours, proliferation of macroinvertebrates, operational problems, biocorrosion, and residual chlorine consume, among others problems. Recently, it has also become evident that biofilms can serve as an environmental reservoir for pathogenic microorganisms, resulting in a potential health risk for humans if left unnoticed. Various studies have been performed in relation to the influence that a number of characteristics of the DWDSs have in biofilm development. Nevertheless, their joint influence, apart from few exceptions, has beenscarcely studied, due to the complexity of the community and the environment under study. This research aims to study the effect that the interaction of the physical and hydraulic conditions of the DWDSs has on biofilm development. To achieve this goal we have compiled biofilm data from different sources and pre-processed it, applying some machine learning methods, to get an extent and complete database. Kernel methods are proposed for the study of biofilm behaviour in this database. They give a systematic and principled approach to training learning machines and are able to manage different types of data, detect data out of range, and achieve a good generalisation performance. Their accuracy and simplicity to approach complex problems has been a decisive factor when choosing this form of address the study of biofilm behaviour in DWDSs. As a result, we are going to achieve a deeper understanding of the consequences that the interaction of the relevant hydraulic and physical factors of DWDSs has on biofilm development. Thus, the effectiveness of the DWDSs management and the quality of the distributed water would increase.

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Productivity Studies Utilizing Recombinant CHO Cells in Stirred-Tank Bioreactors: A Comparative Study Between Pitched-Blade and Packed-Bed Bioreactor Systems

A recombinant Chinese Hamster Ovary (rCHO) cell line designated as CHO SEAP was utilized in this investigation to optimize protein production. Two bench top stirred tank bioreactors, namely a pitched-blade and a packed-bed basket bioreactor, were utilized for a comparative study to determine which bioreactor would produce the best results in terms of protein production. The objective of this research project was toprovide basic data that shows cells cultured in a packed-bed basket bioreactor in perfusion mode will generate more protein product than cells in batch mode suspension culture with a pitched-blade bioreactor. The packed-bed bioreactor creates a homeostatic environment similar to the environment found in vivo, where waste products are constantly removed and fresh nutrients are replenished. Closed batch cultures do not provide a homeostatic environment. In batch culture systems, nutrients are depleted and waste products accumulate. The results from these experiments could help investigatorsinvolved in protein and/or animal vaccine production facilities select the appropriate bioreactor and mode of operation to optimize cell productivity for generation of a specific protein product. CHO cells have been used for the production of vaccines, recombinant therapeutic proteins, and monoclonal antibodies, and these cells are now the cell line of choice in the biotechnology industry. Traditional vaccine production methods in egg embryos are slow and outdated, whereas roller bottle-based cell culture techniques are time consuming and have limited scalability. These limitations justify the need for development of stirred tank bioreactors. Cells cultured in a packed-bed bioreactor arenot exposed to hydrodynamic forces, as is the case with pitched-blade bioreactors, allowing for maximum growth and protein expression. This mode of operation involves the constant removal of media depleted of nutrients and the addition of fresh media with more nutrients to keep the cells growing.

Long run times decrease the constant need for re-seeding cells and re-establishing seed cultures, thus, reducing setup time and labor dramatically. Secreted products are automatically separated from cells in perfusion, eliminating filtration and membrane fouling. A detailed description of both modes of operation will be highlighted in this presentation.

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Effect of Increased Subcutaneous Fat Stores on Fatty Acid Composition of Blood Lipid Fractions and Productive Performance in Periparturient Dairy Holstein Cows

In high producing dairy cows, lipid mobilization takes place during early lactation in order to meet the energy requirement that is not met via diet. This results in a massive release of fatty acids (FA) into the blood as non-esterified fatty acids (NEFA). The objective of this study was to determine the effects of subcutaneous fat stores, as assessed by body condition score (BCS) around the time of calving, and the subsequent lipomobilization during early lactation on FA profile of serum NEFA fraction and on productive performance. During this observational experiment with 22 primiparous and multiparous cows, plasma samples were obtained at -28, -7, +8, +18, and +28d relative to parturition and analyzed for changes in the FA profile of plasma NEFA lipid fraction. Cows were retrospectively dichotomized, based BCS at -7d, into two groups including over-conditioned (BCS ≥ 3.25) and control cow groups (BCS ≤ 3.0). Data were analyzed as repeated measures by using PROC MIXED of SAS (SAS Institute Inc., Cary, NC) and significance was declared at $P < 0.05$. As expected, over-conditioned cows had greater total plasma NEFA concentrations and decreased daily dry matter intake. Milk yield and composition did not differ between groups. More importantly however, several fatty acids in the NEFA fraction of plasma lipids varied significantly, including Myristoleic acid (C14:1), Palmitic acid (C16:0), Strearic acid (C18:0) and Eicosatrienoic acid (C20:3 N3) by BCS around the time of calving. Further investigation is warranted to fully elucidate mechanistic relationship underlying the effects of over conditioning of dairy cows on early postpartum alteration of FA profile in other fractions of plasma lipids including phospholipids as this may directly affect FA profile of circulating immune cells and subsequently their functionality.

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Using Vigor Tests for Predicting Seedling Emergence of Vegetable Seeds Under Greenhouse Conditions

Standard germination test is used in seed industry to evaluate seed quality; however, since is conducted under laboratory conditions, sometimes the estimated results are quite different from those observed at field conditions. This study was developed with the objective to identify the vigor test highly correlated to seedling emergence at field conditions. Five vegetable crops were established in standard germination test, five vigor test, and emergence test at greenhouse conditions. A completely randomized experimental design with four repetitions of 100 seeds was used for each crop. The variables evaluated were: germination and emergence percentage, speed of germination and emergence, shoot and root length, and seedling dry weight. The cold test was associated to tomato and cucumber emergence in greenhouse, meanwhile the accelerated ageing test predicted onion and lettuce emergence. Summer squash emergence it was predicted for immersion in hot water and ammonium chloride vigor tests.

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&
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Development of the Use of Sensors Technology for the Fertilization of Wheat (Triticum aestivum L.) in Mexicali, Baja California, Mexico

Around 80 thousand hectares of wheat are planted annually in the valley of Mexicali, Baja California, Mexico, being this activity important due to the economics and employment that derive from it. Despite its importance, wheat production is at risk of disappearing due to the low profitability of this activity. One of the causes of low profitability of the crop could reside in the possibility of being using more nitrogen (N) fertilizer than necessary in its production. In addition, the N that is not recovered by the crop is lost, accentuating the problems of environmental contamination. The objective of this study was to compare an innovative technology based on an optical sensor (GreenSeeker™) versus traditional fertilization practiced by local farmers. There were established validation field trials in small areas (3 ha) and transfer technology field trials in complete commercial fields in relatively large areas (10-20 ha) with participant local farmers. In the validation fields it was determined the difference in fertilizer doses, yields and costs of fertilization with the traditional management by farmers compared to the use of sensor technology. In general, with similar yields between the two fertilizer application criteria, fertilization applied according with the sensor technology was in average 68 kg de N ha-1 lower than that applied by farmers with their traditional practice. These savings represented an average of $ 107 USD ha-1 ($ 2 140 USD per 20 ha field). It is concluded that in the valley of Mexicali, Baja California, Mexico, it is possible to obtain substantial savings in wheat crop production costs, so contributing to increase the profitability of the activity and reduce environmental impacts by avoiding the application of fertilizers in excess to what is necessary.

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Oilseed Crops for Biofuel Production in Wheat-Based Cropping Systems in the Pacific Northwest, USA

The volatility and uncertain price of petroleum products combined with the need to reduce carbon emissions has created a worldwide interest in renewable fuels to provide "green energy". The United States has set a goal of producing 136 billion liters of biofuel by 2022. The objective of our research was to evaluate three promising oilseed crops in the eastern region of the state of Washington. These oilseed crops are canola (Brassica napus L.), camelina (Camelina sativa L. Crantz), and safflower (Carthamus tinctorious L.). Wheat (Triticum aestivum L.) is the principal crop grown throughout the region, thus any oilseed crop needs to successfully fit into a wheat-based cropping system. For that past 15 years we have evaluated the performance of canola, camelina, and safflower in numerous single-component experiments as well as long-term cropping systems studies. During our oral presentation, we will provide bulleted highlights of several key findings from these studies as well as the prognosis for oilseed crop production in the US Pacific Northwest region in future years.

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Use of Rhizobacteria for the Management of Soft rot Disease of Potato

Potato is an important vegetable crop all over the world. It is vulnerable to many pathological problems, among these, potato soft rot caused by *Erwinia carotovora* has been reported to be most prevalent and destructive. Controlling the plant diseases by pollution free bio-control antagonists (Rhizobacteria) is desirable now a days. Samples of potato wilting plants were collected from different locations. *Erwinia carotovora pv Carotovora* was isolated, purified and identified. Rhizobacteria were also isolated using serial dilution method. Purified isolates were evaluated for their ability to antagonize the rot pathogen *in vitro.* These bacteria were selected for further biochemical and tests. After completion of the tests, these bacteria were evaluated for their possible ability for percentage disease reduction under storage conditions by applying Rhizobacteria as bio-control agents. Moreover, percentage loss in weight was calculated and change in the disease level and growth of the plant in the presence of pathogen and Rhizobacteria were also computed. The application of Rhizobacteria in combinations was proved to be the best one, which was represented by the reduction in the disease of potato.

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In Vitro Propagation of Musa 'Kluai Namwa Mali Ong'

A study on in vitro propagation of banana: Musa 'Kluai Namwa Mali Ong' was carried out by culturing shoot tip, 2 cm in size, in liquid modified MS supplemented with 5 mg/L BA for 3 weeks to obtained clump of shoots. The clump was divided in half and cultured onto modified solid MS medium with 1 mg/L BA for 4 weeks to obtain about 6-7 plantlets/explant. Separated plantlets, cut to 3.5 cm in height or longitudinally divided into halves, were cultured onto modified solid MS media supplemented with 50, 100, and 150 mg/L ascorbic acid for 4 weeks. It was found that the size of explants affected height and numbers of plantlets. The undivided explants produced 0.31plantlets/explant having 5.51 cm in height while the divided explants could produce 1.64 plantlets/explant, having 3.14 cm in height. Ascorbic acid had no effect on height, number of plantlets and size of leaves but the plantlets showed greener leaves. Clumps of 4-5 plantlets that leaves were cut off into stumps of 0.5 x 1.0 cm in size were also used as explants in another experiment. It was found that modified solid MS medium with 6 mg/L BA gave highest number of new shoot i.e. 4.25 shoots/explant, having highest diameter and height of shoot, 0.39, 5.40 cm respectively, with 5.08 leaves and 5.68 roots. Media supplemented with 0.1-1.0 mg/L adenine induced higher number of shoots, with increased diameter, than those of control. A study on induction of embryogenic calli was also conducted. Shoot meristematic tissues were cultured onto modified MS supplemented with 0, 5, 10, 15, 20 μM 2,4-D under dark condition for 6 weeks. The concentration at 5 μM induced the biggest callus of 1.21 in diameter which 80% could be embryogenic calli. Histological study on callus was also performed.

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Effects of Habitat Fragmentation on Breeding Behaviour, Mating Systems and Relatedness of Family Groups in the Co-operatively Breeding Grey-crowned Babbler Pomatostomus Temporalis

Ecosystems that were once naturally connected have suffered drastically from anthropogenic landscape modification. Agricultural systems particularly, have radically modified almost one third of the world's terrestrial habitats, resulting in landscapes of remnant habitat patches within fragmented ecosystems. Critical wildlife habitat continues to be a dwindling resource, profoundly effecting species' experiencing large-scale habitat destruction. Many species are left confined to isolated patches, threatening their persistence in the landscape. This project aimed to identify the effects of habitat fragmentation on the genetic structure of a declining bird, the co-operatively breeding Grey-crowned Babbler, in northern Victoria, Australia.

The Grey-crowned Babbler is a woodland bird clearly affected from habitat loss and fragmentation, suffering population losses of up to 94% in some areas. Requiring close proximity to other groups for their breeding ecology, the combined effects of habitat loss and fragmentation have led to disparate and isolated populations. Recent studies have suggested that social networks and population connectivity are critical to Babbler persistence. Restricted suitable habitat availability as a result of anthropogenic landscape modification brings increasing negative pressures on Grey-crowned genetic variability, breeding integrity, and dispersal opportunities, for a species already suffering alarming population losses.

DNA extracted from blood samples taken across a large-scale study area provided genotypic data, used to determine the differences in genetic structure relating to population size and isolation. Data was analysed to specifically investigate fragmentation effects on breeding behaviour, mating systems and relatedness of family groups. This was conducted by employing a stratified field design of two population sizes; large and small, and two isolation levels; near and far, between groups. We tested the hypotheses that (1) relatedness is higher amongst connected and more closely located groups than more isolated groups, and (2) smaller populations will have higher levels of relatedness amongst individuals than larger populations. We also examined if a combined effect of population size and group isolation on Babbler demographics and genetic structure was apparent.

Increasing knowledge in these areas, not previously investigated, is fundamental for managing biodiversity in the face of climate change, and natural ecosystem shrinkage, loss and degradation, which threatens species worldwide.

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Applicability of Weibull, Log-Logistic and Cox Regression Models on Agricultural Data

Survival analysis are widely used analyses in health related fields. In recent years, survival analysis started being used in many fields involved in living such as biology, agriculture and forestry. As it is known the Cox regression model is the most widely used model for survival data. In this study, preconditions of Cox regression model and how the Cox regression model is implemented on data are shown. In addition to Cox regression model, Weibull and Log logistic regression are introduced. In addition, how parametric (Weibull, Log Logistic regression) and semiparametric (Cox regression) regression models can be used in analyzing agricultural data are discussed.

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Pineapple "Trat Si Thong" Production Technology in Eastern Cultivated Areas, Thailand

Pineapple 'Trat Si Thong' is significant local economic crop in eastern Thailand. The fresh fruits and other products have great potential in the domestic and international market. This study aims to determine some personal background of pineapple growers, their existing production technology and constraints and recommendations on production and market aspects. The research methodology was done through in-depth interviews schedule with stakeholders and 70 pineapple growers in Trat province, eastern Thailand, Crop Year 2011. Descriptive statistics were presented in arithmetic means, percentage, frequency, and standard deviation. The findings revealed that average cultivated area was 10.26 hectares per household. The major occupation of most growers was Hevea brasiliensis plantation. Most land tenure status free of charge land. Majority cultivation pattern was intercropping in Hevea brasiliensis. Double row planting with spacing was 30 cm x 50 cm x 100 cm. Basal application was organic fertilizers. Most side dressing was compound fertilizer, NPK 15-15-15 that was applied twice after planting. Foliar application was applied after flowering. Forced flowering, ethephon (2-chloroethylphosphonic acid) was applied to 8 – month – old plants. The harvesting indices were including age of fruit and color and characteristics of fruit eyes. Most pineapple fruits were wholesale to the dealer. Average net profit was 54,390.25 baht (US $1,813.01, 1 US $=30 baht) per hectares per crop. Most production constraints were weed distribution. Most marketing constraints were limitation of marketing channels and unstable price. Recommendations were production and marketing data should be urgent served in order to support growers' production planning, and research and development on production and marketing should be supported to solve the existing problems and to increase the value of products for more marketing channels.

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Home Range and Habitat Use of the Tawny Frogmouth in Urban Environments

This study compares home range sizes and habitat selection of tawny frogmouths (Podargus strigoides) at sites of varying degrees of urbanization. The tawny frogmouth is a nocturnal cryptic species endemic to Australia. While the species appears to have relatively high densities in urban environments, very little is known about their nocturnal movements and spatial ecology. Therefore, this study, for the first time, aimed to determine the home range size of the tawny frogmouth and the potential influence of sex and weight on home range size; the influence of habitat type on home range size and position within the landscape and whether or not tawny frogmouths have the ability to use anthropogenic structures within their home range. To determine this, twelve birds, seven males and five females were radio-tracked in the outer eastern suburbs of Melbourne, Victoria, Australia. To determine home range size and core use within the home range minimum convex polygons (MCP), 95% fixed-kernel isopleths and 50% fixed-kernel isopleths were calculated. The mean kernel home range for males was 18.92 ± 4.83 ha and the mean kernel home range for females was 6.42 ± 1.53ha. Home range size was dependent on both how urban the habitat was and the sex of the bird. Males increased the size of their home range as the landscape became increasingly urban, whilst females did not. This suggests that males and females were influenced in different ways by urbanization and males are potentially mating with multiple females distributed more widely throughout urban environments. Tawny frogmouths showed a preference for trees and grass and avoided impervious surfaces, but showed flexibility in their ability to utilize artificial perches in urban environments. This tendency to use natural areas suggests a reliance on natural habitat, which indicates that remnant native vegetation should be preserved if tawny frogmouths are to continue to persist in urban environments.

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Consumer Attitudes and Labeling Regimes as Determinants of the Market Success of Food Nanotechnology

The use of nanotechnology in all phases of the food cycle – from farm to fork – has the potential to revolutionize the agri-food sector by increasing food supply and enhancing food quality and safety. Current and potential food nanotechnology applications include; the use of nanosensors for monitoring crop growth and pest control and identifying animal and plant diseases; the use of nanoencapsulated additives and ingredients that enable changes in food texture, taste, processability and quality; packaging material that is more durable, light, can repair tears, can respond to environmental conditions (e.g., moisture, light), improve food safety, signal whether food is contaminated or spoiled or release preservatives that can extend food life (Sekhon 2010).

While the potential benefits of food nanotechnology can be immense, its potential risks are not well understood. Concerns involve the potential toxicity of nanoparticles whose chemical and physical properties can be very different from those of macro particles of the same composition, thus, while the latter may be harmless, the former could be toxic to humans and/or the environment (NanoBio-Raise 2011). According to some estimates, hundreds of nanofoods and food packaging applications are already in the market (NanoBio-Raise 2011) and given current regulations labeling of these products is not required.

The paper examines the market and welfare effects of the introduction of food nanotechnology innovations under different labeling regimes. We develop an analytical framework of heterogeneous consumers who differ in their attitude towards interventions in the production process and imperfectly competitive producers (processors and and specify the exact conditions under which food nanotechnology innovations will end up being (a) ineffective, (b) non-drastic, and (c) drastic. We show that, even when all consumers are averse to nanotechnology, the introduction of food nanotechnology innovations that offer enhanced attributes can be

welfare enhancing for all consumers while welfare is in most cases lower for non-adopting producers when the technology isnot ineffective.

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Anaerobic Ammonium Oxidation in Upflow Anaerobic Sludge Blanket Reactor for Reject Water Treatment

Rapid and robust start- up of anaerobic ammonium oxidation (anammox) process from various seeding materials for treatment of N-rich waste streams is needed for development of cost and energy saving technologies. In the current study rapid anammox start-up (elimination of NH4+ and NO2-) was achieved by inoculation with not anammox-specific UASB sludge treating industrial SO42-- and N-rich yeast factory wastewater. Increasing frequency when reactor biomass is fluidized by means of feeding with a higher flow rate, improved TN removal rate, but also NOBs activity. Maximum TN removal rates of 500 g m-3d-1 with removal efficiency of 70 % were achieved at moderate temperature of 20^{o}C after a one year operation period. As a result of PCR on anammox uncultured Planctomycetes clone 07260064(4)-2-M13-_A01 (GenBank: JX852965) was identified from the reactor. qPCR conducted with the SRB dsrA-gene specific primers showed a rapid decrease in SRB/16S ratios in the reactor, compared to inoculum.

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Managing Limited Irrigation for Maximizing Grain Production in the North China Plain

The North China Plain (NCP) is one of the main grain production areas in China, its water shortage problem is a serious concern. To cope with scarce supplies, deficit irrigation scheduling has been widely adopted to winter wheat in NCP. Good results have been achieved that irrigation can be reduced up to 30% by adopting deficit irrigation scheduling without yield loss. The improved grain production under moderate water deficit for winter wheat was related to the longer grain filling duration and higher dry matter mobilization efficiency that improved harvest index. Wheat under water stress tended to flower earlier and thus gain several days during the grain filling stage, before high temperature in June limited further grain fill and accelerated crop maturity in NCP. The senescence and mobilization promoted by water deficits during the grain filling period are coupled processes in wheat. Even with less than maximum biomass accumulation, the higher harvest index compensated this loss and the final yield was improved.

Effective measures to increase the utilization of stored soil water could improve crop performance under conditions of limited water supply in the NCP. Recent measurements showed that the bulky density was increased under the tillage layer and soil pan is becoming thick and moving upwards with the application of minimum tillage practices in the NCP. The increase both in bulk density and thickness of the soil pan significantly affected the distribution of root length density (RLD), resulting in greater RLD in the tillage layer and smaller RLD in deep soil profile. Results showed that changing cultivation practices were possible ways to break the soil pan to improve root growth in the deeper soil layers that will benefit soil water use.