

2015

Agriculture, Ecology & Water Abstracts

Eighth Annual International
Symposium on Agriculture,
Third Annual International
Conference on Ecology,
Ecosystems and Climate Change
& Third Annual International
Forum on Water
13-16 July 2015, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH



Agriculture, Ecology &
Water Abstracts
8th Annual International
Symposium on Agriculture,
3rd Annual International
Conference on Ecology,
Ecosystems and Climate
Change & 3rd Annual
International Forum on Water
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Greece

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Preface

This abstract book includes all the abstracts of the papers presented at the *8th Annual International Symposium on Agriculture, 13-16 July 2015*, *3rd Annual International Conference on Ecology, Ecosystems and Climate Change* & *3rd Annual International Forum on Water*, organized by the Athens Institute for Education and Research. In total there were 87 papers and 88 presenters, coming from 43 different countries (Albania, Algeria, Australia, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Egypt, Ethiopia, Germany, Hong Kong, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Kenya, Latvia, Lithuania, Mexico, Norway, Philippines, Poland, Romania, Russia, Slovakia, South Africa, South Korea, Spain, Taiwan, Thailand, The Netherlands, Tunisia, Turkey, UK and USA). The conferences were organized into 22 sessions that included areas such as Sanitation and Biocontrol, Crop Growth, Animal and Fishery Studies, Planting Systems, Water Uses and other related fields. 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 and/or journals 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
8th Annual International Symposium on Agriculture, 3rd Annual
International Conference on Ecology, Ecosystems and Climate
Change and 3rd Annual International Forum on Water, 13-16 July
2015, Athens, Greece

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

Organization and Scientific Committee

1. Dr. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, UK.
2. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
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8. Dr. João Simões, Assistant Professor, Department of Veterinary Science, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal.
9. Dr. Masoud Zaker, Plant Pathologist, Department of Plant Protection, Shahrood Agricultural Research Center, Shahrood, Iran.
10. Mr. Som Pal Baliyan, Lecturer, University of Botswana, Botswana.
11. Ms. Olga Gkounta, Researcher, ATINER.

Administration

Stavroula Kyritsi, Konstantinos Manolidis, Katerina Maraki & Kostas Spiropoulos

Monday 13 July 2015

(all sessions include 10 minutes break)

08:30-09:00 Registration and Refreshments

09:00-09:30 (ROOM B) Welcome & Opening Remarks

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

09:30-11:30 Session I (ROOM B): Crop Growth, Sanitation & Biocontrol I	09:30-11:30 Session II (ROOM A): Water Uses, Ambiance & Innovation I
<p>Chair: George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.</p> <ol style="list-style-type: none"> 1. <u>Stelica Cristea</u>, Professor, University of Agronomic Sciences and Veterinary Medicine, Romania, Stefana Jurcoane, Professor, University of Agronomic Sciences and Veterinary Medicine, Romania, Florentina Matei, Associate Professor, University of Agronomic Sciences and Veterinary Medicine, Romania, Paul Dobre, Associate Professor, University of Agronomic Sciences and Veterinary Medicine, Romania, Anibal Capuano, Technical Director, Camelina Company Espana S.L., Romania & Yuri H. Yambanis, General Director, Camelina Company Espana S.L., Romania. Camelina Pathology - Seed Mycoflora Extension. 2. <u>Gaetan Moreau</u>, Associate Professor, Universite de Moncton, Canada, Charles Comeau, Aquaculture and Fisheries New Brunswick, Canada, Finbarr Horgan, International Rice Research Institute, Philippines, Jean-Philippe Michaud, Royal Canadian Mounted Police, Canada & Jean-Pierre Prive, Plant Medic Inc., Canada. Effects of Perturbations on Ecological Services Provided by Heterotrophic Insects in Temperate and Tropical Agroecosystems. 3. <u>M. Claudia Diez</u>, Associate Professor, Universidad Nacional de Colombia Sede Medellin, Colombia, Flavio Moreno, Associate Professor, Universidad Nacional de Colombia Sede Medellin, Colombia & N. Walter Osorio, Associate Professor, Universidad Nacional de Colombia Sede Medellin, Colombia. Effect of Fertilizer Application on Flowering and Fruiting of Vanilla (<i>Vanilla Planifolia</i> Jacks. Ex Andr.). 4. <u>Gyula Oros</u>, Senior Researcher, Plant Protection Institute HAS, Hungary, Zoltan Naar, Plant Protection Institute HAS, Hungary, Ester R. Eszeki, Plant Protection Institute HAS, Hungary & Donat Magyar, Plant Protection Institute HAS, Hungary. The Experience of Development of Fungicidal Preparations Based on <i>Trichoderma</i> Species. 5. <u>Makhosi Buthelezi</u>, Researcher, Mangosuthu University of Technology, South Africa, Desmond Conlong, Senior Entomologist, Senior Lecturer, South African Sugarcane Research Institute, 2 University of KwaZulu-Natal, South Africa & Godfrey Zharare, Senior Lecturer, University of Zululand, South Africa. Seasonal Monitoring of the Incidence and Flight 	<p>Chair: Olga Gkounta, Researcher, ATINER.</p> <ol style="list-style-type: none"> 1. Namsik Park, Professor and Director of Subsurface Reservoir Research Center, Dong-A University, Korea. A Simulation-Optimization Model for Pumping and Injection wells of a Subsurface Reservoir. 2. <u>*Shlomo Nir</u>, Professor Emeritus, The Hebrew University of Jerusalem, Israel, Nadya Rakovitsky, Ilya Brook & Jaap Van Rijn. Purification of Greywater by a Moving Bed Reactor Followed by a Filter Including a Granulated Micelle-Clay Composite. 3. <u>*Saziye Balku</u>, Associate Professor, Atilim University, Turkey, Magdi Buaisha, Ph.D. Student, Atilim University, Turkey & Seniz Ozalp Yaman, Associate Professor, Atilim University, Turkey. An Optimum Design for Activated Sludge Systems. 4. <u>Ajay Dwivedi</u>, Junior Research Fellow, National Environmental Engineering Research Institute, India, M Suresh Kumar, Sr. Principal Scientist, National Environmental Engineering Research Institute, India & A.N. Vaidya, National Environmental Engineering Research Institute, India. Audit Based Approach for Water Footprint Assessment in a Molasses Based Distillery. 5. <u>Jae Gon Kim</u>, Research Scientist, Korea Institute of Geoscience and Mineral Resources, Korea, Chul-Min Chon & In-Hyun Nam. Magnetite and Birnessite Composite for Treatment of as (III) Contaminated Water.

Activity of the Groundnut Leaf Miner (<i>Aproaerema</i> sp.) at Five Sites in South Africa.	
6. <u>Ferenc Pal-Fam</u> , Associate Professor, Kaposvar University, Hungary, Richard Hoffmann, Lecturer, Kaposvar University, Hungary & Sandor Keszthelyi, Associate Professor, Kaposvar University, Hungary. The Effect of Diatomaceous Earth on Tomato Yield in Horticultural Cultivation.	

11:30-13:00 Session III (ROOM B): Education and Economics I	11:30-13:00 Session IV (ROOM A): Animal and Fishery Sciences, Health and Toxicology I
Chair: *Saziye Balku, Associate Professor, Atılım University, Turkey.	Chair: *Shlomo Nir, Professor Emeritus, The Hebrew University of Jerusalem, Israel.
<ol style="list-style-type: none"> 1. Min-Hsien Yang, Professor, Feng Chia University, Taiwan. Total Factor Productivity Growth and Convergence Testing in Asian Agriculture under Open Economy. 2. <u>Christopher J. Moon</u>, Senior Lecturer and Ecopreneur, Middlesex University, U.K. & <u>Joseph Gebbels</u>, Independent Agricultural Advisor, U.K. The Role of Universities in the Provision of Corporate Social Responsibility and Ethics Teaching in the Agricultural Sector. 	<ol style="list-style-type: none"> 1. <u>José Edgar Zapata Montoya</u>, Professor, Universidad de Antioquia, Colombia, Natalia Andrea Gomez Grimaldos, Professor, Universidad de Antioquia, Colombia & Leidy Johana Gomez Sampedro, Professor, Universidad de Antioquia, Colombia. Time of Hydrolysis as Function of Substrate Concentration and Enzyme/Substrate Ratio in the Kinetic of Enzymatic Hydrolysis of Bovine Plasma Protein. 2. Babitha Vazhoor, Assistant Professor, Kerala Veterinary and Animal Sciences University, India, Dildeep Varadan, Assistant Professor, Kerala Veterinary and Animal Sciences University, India, G. Taru Sharma, Principal Scientist, Deemed University, India & Mihir Sarkar, Principal Scientist, Deemed University, India. Expression and Localization of Vascular Endothelial Growth Factor and Its Receptors in the Ovarian Follicle during Estrous Cycle of Water Buffalo (<i>Bubalus Bubalis</i>). 3. <u>Asbjørn Bergheim</u>, Senior Researcher, IRIS – International Research Institute of Stavanger, Norway & Arve Nilsen, NVI – Norwegian Veterinary Institute, Norway. Intensification of Salmonid Aquaculture. 4. Yinping Wang, Ph.D. Student, Nanjing Institute of Geography and Limnology, China. The Fate of ¹⁵N-Enriched Cyanobacteria Feed by Planktivorous Fish in an Enclosure Experiment: A Stable Isotope Tracer Study.

13:00-14:00 Lunch

14:00-15:30 Session V (ROOM B): Policies, Organizations and Planting Systems I	14:00-15:30 Session VI (ROOM A): Climate Change and Environment I
Chair: Stelica Cristea, Professor, University of Agronomic Sciences and Veterinary Medicine, Romania	Chair: Gaetan Moreau, Associate Professor, Université de Moncton, Canada.
<ol style="list-style-type: none"> 1. Florencia Charito Sebastian, Associate Professor, University of the Philippines, Philippines. Examination of the Philosophy of Cooperative Action as Applied to Philippine Community Forestry. 2. Kunpeng Yi, Postdoc, Institute of Remote Sensing and Digital Earth, Chinese Academy Sciences, China. Farmer 	<ol style="list-style-type: none"> 1. <u>Dace Grauda</u>, Associate Professor and Leading Researcher, University of Latvia, Latvia, Inta Belogradova, Researcher, Institute of Biology, University of Latvia, Latvia, Isaak Rashal, Head of the Laboratory, University of Latvia, Latvia & Lada Bumbure, Researcher, Riga Technical University, Latvia. The Influence of Low Frequency Electromagnetic Field on Plant Cells. 2. <u>Flavio Moreno</u>, Associate Professor, Universidad

<p>Participation Network Platform towards Crop Observation and Sample Data Collection.</p> <p>3. <u>Giedre Samuoliene</u>, Senior Researcher, Lithuanian Research Centre for Agriculture and Forestry, Lithuania, Alina Ceidaite, Ph.D. Student, Lithuanian Research Centre for Agriculture and Forestry, Lithuania, Ramunas Sirtautas, Researcher, Lithuanian Research Centre for Agriculture and Forestry, Lithuania & Darius Kviklys, Senior Researcher, Lithuanian Research Centre for Agriculture and Forestry, Lithuania. Physiological Aspects of Biennial Bearing by Manipulating Crop Load in Apple Tree.</p> <p>4. Slimane Bedrani, Professor, Ecole Nationale Supérieure Agronomique, Algeria. Food Security in Algeria.</p>	<p>Nacional de Colombia Sede Medellinm, Colombia, M. Claudia Diez, Associate Professor, Universidad Nacional de Colombia Sede Medellinm, Colombia & Edison Gantiva, M.Sc. Student, Universidad Nacional de Colombia Sede Medellinm, Colombia. Effects of Light Intensity on the Morphology and CAM Photosynthesis of <i>Vanilla Planifolia</i> Andr.</p> <p>3. <u>Ju Young Lee</u>, Senior Researcher, Korea Institute of Science and Technology, South Korea, Hak Cheol Kwon, Principle Researcher, Korea Institute of Science and Technology, South Korea, Su-Nam Kim, Principle Researcher, Korea Institute of Science and Technology, South Korea, Jae Wook Lee, Principle Researcher, Korea Institute of Science and Technology, South Korea, Jin-Soo Park, Jin Wook Cha, Principle Researcher, Korea Institute of Science and Technology, South Korea, Min Jung Lee, Senior Researcher, LED-IT Fusion Technology Research Center, Yeungnam University, South Korea. Ecological Relationships between Habitat Conditions, Plant Diversity and Geographic Location on the National Park, South Korea.</p> <p>4. Ming Luo, Postdoctoral Fellow, The Chinese University of Hong Kong, Hong Kong. Multiscaling Behavior in Global Dry/Wet Conditions.</p> <p>5. Xin Zhao, Chief Engineer, Changjiang River Scientific Research Institute, China. A 3D Modeling for Eutrophication in the Daning River, Three Gorges Reservoir Area, China.</p> <p>6. Maysa Hatata, Assistant Professor, Alexandria University, Egypt. Functional and Ultrastructural Changes of the Photosynthetic Apparatus in Leaves of Broad Bean Plants (<i>Vicia faba</i> L) in Response to Cd and Zn Interaction.</p>
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15:30-17:00 Session VII (ROOM B): Crop Growth, Sanitation & Biocontrol II	15:30-17:00 Session VIII (ROOM A): Water Uses, Ambiance & Innovation II
<p>Chair: Joseph Gebbels, Independent Agricultural Advisor, U.K.</p> <p>1. <u>Lilliana Hoyos-Carvajal</u>, Professor, Universidad Nacional de Colombia, Colombia, S. Espinosa, Espinosa, S., Quiroz, I., Silva, M., Maya, M. F., Mercado, C., Quiroz, J.A. & Santos, A., Universidad Nacional de Colombia, Colombia. A Case of Biocontrol of Invasive Plague in Colombian Seaflower Biosphere Reserve.</p> <p>2. <u>Hemmatollah Pirdashti</u>, Scientific Member, Sari Agricultural Sciences and Natural Resources University, Iran, Zahra Nouri, MSc. Student, Sari Agricultural Sciences and Natural Resources University, Iran, Valiollah Ghasemi Omran, Assistant Professor, Sari Agricultural Sciences and Natural Resources University, Iran & Yasser Yaghoubian, Ph.D. Student, Ramin Agricultural and Natural Resources University, Iran. Effect of Salt Stress on Some Physiological and Morphological Parameters of <i>Stevia (Stevia Rebaudiana</i> B.) Medicinal Plants under Controlled Conditions.</p>	<p>Chair: Florencia Charito Sebastian, Associate Professor, University of the Philippines, Philippines.</p> <p>1. <u>Eva Ramos Martinez</u>, Ph.D. Student, IMM-FluIng, Universitat Politècnica de Valencia, Spain, Manuel Herrera, Research Associate, Imperial College of London, U.K., Joaquin Izquierdo, Professor, IMM-FluIng, Universitat Politècnica de Valencia, Spain & Rafael Perez Garcia, Professor, IMM-FluIng, Universitat Politècnica de Valencia, Spain. Multi-Agent Approach to Biofilm Development in Water Supply Systems.</p> <p>2. <u>Juan Grima</u>, Researcher, Instituto Geológico y Minero de España, Spain & Bruno Ballesteros, Head of Valencia Unit, Instituto Geológico y Minero de España, Spain. Characterization of Wetlands and its Relationship to Groundwater in a Semiarid Mediterranean Environment.</p>

17:00-18:30 Session IX (ROOM B): Crop Science, Biotechnology & Diseases I	17:00-18:30 Session X (ROOM A): Water Resources and Quality I
Chair: <u>Dace Gauda</u> , Associate Professor and Leading Researcher, University of Latvia, Latvia.	Chair: Olga Gkounta, Researcher, ATINER.
<ol style="list-style-type: none"> 1. Alfonso Larque-Saavedra, Professor, Scientific Research Center of Yucatan, Mexico. Prehispanic Biotechnology in Mexico. 2. <u>Yong Hoon Lee</u>, Professor, Chonbuk National University, Korea & Dipto Bhattacharyya, Post-doctoral Fellow, Chonbuk National University, Korea. <i>Proteus Vulgaris</i> JBS202 Modulated Phenotypes of <i>Arabidopsis Thaliana</i> and its Rhizosphere Microbiome. 3. <u>*Bao-Luo Ma</u>, Research Scientist, Agriculture and Agri-Food Canada, Canada, Wei Wu, Agriculture and Agri-Food Canada & Sumei Yao, Agriculture and Agri-Food Canada. Sensing Root Electrical Capacitance for Delineating Canola Genotypic Differences in Response to Heat and Drought Stresses. 4. *Ayman Mostafa, Faculty Member, University of Arizona, USA. Reestablishing IPM Recommendations for Key Insect Pests of Alfalfa Hay in the Low Desert of Southwestern the U.S. 5. <u>Masarrat Mohamed Abdel Aziz Migahid</u>, Professor, Alexandria University, Egypt, Amal Mohamed Fakhry, Assistant Professor, Alexandria University, Egypt & Azhar El-nouby Ahmad, Assistant Lecturer, Alexandria University, Egypt. Herbicidal Activity of <i>Asphodelus Microcarpus</i> against Selected Weed Species (<i>Chenopodium Album</i>) of Wheat (<i>Triticum Aestivum</i>). 	<ol style="list-style-type: none"> 1. *Joseph Dellapenna, Professor, Villanova University, USA. Patterns of Water Law. 2. <u>Assia Meziani</u>, Assistant Professor, University of El-Oued, Algeria, Boualam Remini, University of El-Oued, Algeria & Djamel Boutaotaou, University of El-Oued, Algeria. Evaporation of Dam Lakes in Arid Region - Algeria. 3. Gabriel Minea, Researcher, National Institute of Hydrology and Water Management, Romania. Hydrological Effect of Land Use at Plot Scale. 4. Mariem Makhlof, Ph.D. Student, National Agronomic Institute of Tunis, Tunisia, Ali Chebil, Researcher, The International Center for Agriculture Research in the Dry Areas, Tunisia, Aymen Fria, Researcher, The International Center for Agriculture Research in the Dry Areas, Jordan, Talel Stanbouli, Teacher-Researcher, Higher School of Agriculture Mograne, Tunisia, Asma Souissi, Ph.D. Student, Higher School of Agriculture Mograne, Tunisia & Abdallah Benalaya, Professor, Higher School of Agriculture Mograne, Tunisia. Quantification of Virtual Water Flows Embedded in the Exchanged Agricultural Commodities of Tunisia. 5. <u>Melissa Baker</u>, Lecturer, University of South Africa, South Africa & Kevin Mearns, Professor, University of South Africa, South Africa. Using Sustainable Tourism Indicators to Manage Scarce Water Resources in the Namibian Tourism Industry: the Case of two Wilderness Safaris Camps in Namibia. 6. <u>Temesgen Enku</u>, Ph.D. Student, Bahir Dar University, Ethiopia, Assefa M. Melesse, Florida International University, USA, Essayas K. Ayana, Bahir Dar University, Ethiopia, Seifu A. Tilahun, Bahir Dar University, Ethiopia, Gete Zeleke, Water and Land Resource Centre, Ethiopia & Tammo S. Steenhuis, Cornell University, USA. Watershed Storage Dynamics in the Upper Blue Nile Basin: The Anjeni Experimental Watershed, Ethiopia.

18:30-20:00 Session XI (ROOM B): Animal and Fishery Sciences, Health and Toxicology II	18:30-20:00 Session XII (ROOM A): Climate Change and Environment II
Chair: *Bao-Luo Ma, Research Scientist, Agriculture and Agri-Food Canada.	Chair: *Ayman Mostafa, Faculty Member, University of Arizona, USA.
<ol style="list-style-type: none"> 1. <u>Sangho Moon</u>, Professor, Konkuk University, South Korea, Nayeon Kim, Sungjin Kim & Seyeoung Jang, Konkuk University, South Korea. Effects of Growth Stage and Season on the Behavioural Characteristics in Hanwoo (<i>Bos taurus coreanae</i>) Steer. 2. Milena Bozhilova-Sakova, Ph.D. Student, University of Forestry, Bulgaria. PCR-RFLP Analysis of CAST Gene in one Bulgarian Sheep Breed. 3. <u>Nicola Decaro</u>, Associate Professor, University 	<ol style="list-style-type: none"> 1. *Mordechai Shechter, Senior Research Fellow, University of Haifa, Israel. Economic Aspects of Adaptation to Climate Change: Findings of Israel's Climate Change Information Center (ICCIC). 2. Hassan Ahmadi, Faculty Member, Islamic Azad University, Roudehen Branch, Iran. Effect of Upstream Slope and Curvature of Spillway Crest on Occurrence of Cavitation on Ogee Spillways. 3. <u>*Wa'd Odeh</u>, Master Student, Ben-Gurion University of the Negev, Israel, Shai Arnon, Lecturer, Ben-Gurion University of the Negev,

of Bari, Italy, Leonardo Occhiogrosso, Post-doc, University of Bari, Italy, Mariastella Lucente, Post-doc, University of Bari, Italy, Viviana Mari, Post-doc, University of Bari, Italy, Gabriella Elia, Associate Professor, University of Bari, Italy, Eleonora Lorusso, Post-doc, University of Bari, Italy & Canio Buonavoglia, Professor, University of Bari, Italy. Emerging Pestiviruses and Impact on Animal Production.

Israel, Alon Tal, Associate Professor, Ben-Gurion University of the Negev, Israel, Alfred Abd Rabbo, Chairman of Chemistry Department, Bethlehem University, Palestine & Nader Al Khatib, Director, Water & Environmental Development, Organization (WEDO), Bethlehem University, Palestine. Occurrence and Fate of EDCs in Wastewater and Aquatic Environments in the West Bank of Palestine.

21:00-23:00 Greek Night and Dinner (Details during registration)

Tuesday 14 July 2015

08:00-10:00 Session XIII (ROOM B): Education and Economics II	08:00-10:00 Session XIV (ROOM A): Climate Change and Environment III
Chair: *Joseph Dellapenna, Professor, Villanova University, USA.	Chair: George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
<ol style="list-style-type: none"> Phenchan Whijitara, Agricultural Research Officer, Ministry of Agriculture and Cooperatives, Thailand. Good Practices on Pineapple 'Trat Si Thong' Production in Eastern Thailand. Phineas Khazamula Chauke, Associate Professor, Head of Department Agricultural Economics and Agribusiness and Land Bank Chair of Agriculture School of Agriculture, University of Venda, South Africa. Teachers' Perceptions Regarding Curriculum Evolvment, Infrastructure Provision and Quality Enhancement in Limpopo Province, South Africa. *Talel Stambouli, Assistant Professor, Ecole Supérieure d'Agriculture de Mograne, Tunisia, Benalaya Abdallah, Ecole Supérieure d'Agriculture de Mograne, Tunisia, Hammami Rifka, Institut National de la Recherche Agronomique de Tunisie, Tunisia, Laajili-Ghezal Lami, Ecole Supérieure d'Agriculture de Mograne, Tunisia & Souissi Asma, Ecole Supérieure d'Agriculture de Mograne, Tunisia. Virtual Water Balance Estimation in Tunisia. 	<ol style="list-style-type: none"> A.J. Stagliano, Professor, Saint Joseph's University, USA. Climate Change Accountability: Do Firms Adequately Disclose the Financial Consequences of the EU-ATS? Junko Yoshida, Graduate Student, Mie University, Japan and Ghent University, Belgium, Hiroshi Ehara, Professor, Mie University, Japan, Norihiko Tomooka, Unit Leader, Genetic Resources Center, National Institute of Agrobiological Sciences, Japan & Hitoshi Naito, Professor, Kurashiki University of Science and The Arts, Japan. Growth and Physiological features of Wild <i>Vigna</i> Species under NaCl Treatment. Bari Hodaj, Lecturer, Agriculture University of Tirana, Albania, Petrit Ramaj, Agriculture University of Tirana, Albania & Ardian Doko, Agriculture University of Tirana, Albania. Phenological Stages and Climatic Adaptation of Hazelnut cv. Visoka. Brian Kelleher, Lecturer, Dublin City University, Ireland, Paul Flanagan, Post-doctoral, Dublin City University, Ireland, Kris Hart, Post-doctoral, Dublin City University, Ireland, Chris Allen, Lecturer, Queens University Belfast, U.K., Andre Simpson, Lecturer, University of Toronto, Canada, Seth Oppenheimer, Lecturer, Mississippi State University, USA, Brian Murphy, Post-doctoral, Dublin City University, Ireland, Shane O'Reilly, Post-doctoral, Dublin City University, Ireland & Sean Jordan, Dublin City University, Ireland. How Does the Addition of Sulphur to Soil Influence Chemosynthesis and Carbon Flux? *Essam Hoballah, Associate Professor, National Research Centre, Egypt, M. Saber, National Research Centre, Egypt, I. Matter, National Research Centre, Egypt & A. Zaghloul, National Research Centre, Egypt. Bioremediation of Polyaromatic Hydrocarbons (PAHs) in a Sewaged Soil by Certain Remediative Amendments followed by Phytoremediation.

10:00-11:30 Session XV (ROOM B): Policies, Organizations and Planting Systems II	10:00-11:30 Session XVI (ROOM A): Crop Science, Biotechnology & Diseases II
<p>Chair: *Talel Stambouli, Assistant Professor, Ecole Supérieure d'Agriculture de Mograne, Tunisia.</p> <ol style="list-style-type: none"> 1. *Spiro Adamopoulos, Chief Executive Officer, Agricultural Levies Institute of Australia, Australia. Factors Determining Public Good and National Interest Policy in the Australian Agricultural Sector. 2. <u>Lavinia-Mariana Berca</u>, Postdoctoral Researcher, University of Agronomic Science and Veterinary Medicine, Romania & Stelica Cristea, Professor, University of Agronomic Science and Veterinary Medicine, Romania. The Distribution of <i>Alternaria</i> sp. on <i>Brassica napus</i> and <i>Sinapis</i> sp. from the South Region of Romania. 3. <u>Anas Abusada</u>, Researcher, Wageningen University, The Netherlands & Jeroen Warner, Wageningen University, The Netherlands. The Development of a Scientific Plan for the Development of the Agricultural Chain of Production in Palestine. 4. <u>Eva Bozsik</u>, Ph.D. Student, University of Debrecen, Hungary, Janos Raso, Research Assistant, National Agricultural Research and Innovation Centre, Hungary, Peter Riczu, Research Assistant, University of Debrecen, Hungary, Bernadett Galya, Ph.D. Student, University of Debrecen, Hungary, Imre Csiha, Station Manager, National Agricultural Research and Innovation Centre, Hungary & Janos Tamas, Head and Professor, Institute of Water and Environmental Management and University of Debrecen, Hungary. Evaluation of Afforestation Possibilities in One Part of the Great Hungarian Plain. 	<p>Chair: *Essam Hoballah, Associate Professor, National Research Centre, Egypt.</p> <ol style="list-style-type: none"> 1. <u>Zehra Tugba Abaci</u>, Assistant Professor, Ardahan University, Turkey, Emre Sevindik, Assistant Professor, Adnan Menderes University, Turkey, Fatih Coskun, Assistant Professor, Balikesir University, Turkey, Muaviz Ayvaz, Assistant Professor, Adnan Menderes University, Turkey, Huseyin Uysal, Assistant Professor, Adnan Menderes University, Turkey & M. Kemal Avci, Research Assistant, Adnan Menderes University, Turkey. Molecular Systematic Relation ndhF (cpDNA) some of <i>Silene</i> L. Taxa Belonging Auriculatae and Brachypodeae Section Spread in Turkey. 2. <u>Armagan Kaya</u>, Assistant Professor, Adiyaman University, Turkey & Emel Yigit, Associate Professor, Inonu University, Turkey. Effects of Salicylic Acid and Flurochloridone on the Physiological and Biochemical Parameters in <i>Vicia Sativa</i>. 3. <u>Hannah Karuri</u>, Lecturer, Embu University College, Kenya, Ruth Amata, Embu University College, Kenya, Nelson Amugune, Embu University College, Kenya & Charles Waturu, Embu University College, Kenya. Nematode Community Response to Bt Cotton in a Kenyan Field Trial. 4. <u>Inta Belogradova</u>, Researcher, Institute of Biology, University of Latvia, Latvia, Dace Grauda, Associate Professor and Leading Researcher, University of Latvia, Latvia & Isaak Rashal, Head of the Laboratory, University of Latvia, Latvia. Molecular Methods of Investigation Species of Genetic Diversity Determination in the Urban Area Riga, Latvia. 5. <u>Valentina Obradovic</u>, Lecturer, Polytechnic in Pozega, Croatia, Josip Mesic, Lecturer, Polytechnic in Pozega, Croatia, Brankica Svitlica, Lecturer, Polytechnic in Pozega, Croatia & Maja Ergovic Ravacic, Lecturer, Polytechnic in Pozega, Croatia. Influence of Mycorrhiza and Different Yeast Strains on Physical, Chemical and Organoleptic Properties of Graševina (<i>Vitis Vinifera</i> L.) Wine.

11:30-13:00 Session XVII (ROOM B): Crop Growth, Sanitation & Biocontrol III	11:30-13:00 Session XVIII (ROOM A): Water Resources and Quality II
<p>Chair: Anas Abusada, Researcher, Wageningen University, The Netherlands.</p> <ol style="list-style-type: none"> 1. <u>Juan Martinez-Solis</u>, Professor and Researcher, Chapingo Autonomous University, Mexico, Margarita Gisela Pena-Ortega, Professor and Researcher, Chapingo Autonomous University, Mexico & Juan Enrique Rodriguez Perez, Researcher, Chapingo Autonomous University, Mexico. Impact of Fruit and Seed Maturity Stages on Germinability. 2. <u>Tiberius Balaes</u>, Researcher, Alexandru Ioan Cuza University of Iasi, Romania & Catalin 	<p>Chair: Hannah Karuri, Lecturer, Embu University College, Kenya.</p> <ol style="list-style-type: none"> 1. <u>Nesli Ciplak</u>, Assistant Professor, University of Karabuk, Turkey. A Review of Decision Making Methods in Sustainable Waste Management. 2. <u>Bernadett Galya</u>, Ph.D. Student, University of Debrecen, Hungary, Peter Riczu, Research Assistant, University of Debrecen, Hungary, Lajos Blasko, University of Debrecen, Hungary & Janos Tamas, Head and Professor, Institute of Water and Environmental Management and University of Debrecen, Hungary. Risk

<p>Tanase, Professor, Alexandru Ioan Cuza University of Iasi, Romania. Gnicolous Basidiomycete Species Adapted for Biocontrol of Nematodes.</p> <p>3. <u>Dariusz Panka</u>, Assistant Professor, UTP University of Science and Technology in Bydgoszcz, Poland, Malgorzata Jeske, Assistant Professor, Dariusz Piesik, Associate Professor, Katarzyna Koczwar, Doctorate Student, Natalia Musial, Doctorate Student, Marcin Juda, Doctorate Student & Karol Lisiecki, Doctorate Student, UTP University of Science and Technology in Bydgoszcz, Poland. Effect of <i>Neotyphodium</i> Endophyte on Defense Reaction of Perennial Ryegrass (<i>Lolium Perenne</i> L.) under Infection by Pathogenic Fungi.</p> <p>4. <u>Ronald Mandumbu</u>, Lecturer, Bindura University of Science Education, Zimbabwe, C.S. Mutengwa, Lecturer, University of Fort Hare, South Africa, S. Mabasa, Lecturer, University of Zimbabwe, Zimbabwe & E. Mwenje, Professor, University of Science Education, Zimbabwe. Tolerance Parameters of <i>Sorghum Bicolor</i> L and <i>Sorghum Arundinaceum</i> to <i>Striga Asiatica</i> under Mulch.</p>	<p>Assessment of Drought Impacted Areas in Great Plain of Hungary.</p> <p>3. <u>Luo-Ping Zhang</u>, Professor, Xiamen University, China, Hongni Xu, Master Student, Xiamen University, China, Huaxia Sheng, Ph.D. Student, Xiamen University, China & Weiqi Chen, Professor, Xiamen University, China. Evaluation of Marine Ecosystem Intrinsic Value.</p> <p>4. <u>Weiqi Chen</u>, Professor, Xiamen University, China, Xinxin Wu, Graduate Student, Xiamen University, China & Luo-Ping Zhang, Professor, Xiamen University, China. Estimation of Marine Ecosystem Extrinsic Value.</p> <p>5. Asma Souissi, Ph.D., Student, High School of Agriculture in Mograne, Tunisia, Abdallah Benalaya, Professor, High School of Agriculture in Mograne, Tunisia & Amal Mejri, Engineer Student, High School of Agriculture in Mograne, Tunisia. The Effects of Consumer's Water footprint of Agricultural Products on Food Security in Tunisia.</p>
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13:00-14:00 Lunch

14:00-15:30 Session XIX (ROOM B): Crop Science, Biotechnology & Diseases III	14:00-15:30 Session XX (ROOM A): Water Uses, Ambiance & Innovation III
<p>Chair: *Thomas Akuja, Associate Professor, South Eastern Kenya University, Kenya.</p> <p>1. <u>Margarita Gisela Pena-Ortega</u>, Professor and Researcher, Chapingo Autonomous University, Mexico, Aureliano Pena-Lomeli, Researcher, Chapingo Autonomous University, Mexico, Karen Cartensen-Benavides, MSc Student, Chapingo Autonomous University, Mexico & Juan Martinez-Solis, Professor and Researcher, Chapingo Autonomous University, Mexico. Molecular Characterization of Reference Husk Tomato (<i>Physalis Ixocarpa</i> Brot.) Varieties through ISSR Markers.</p> <p>2. <u>Daniela Piaze Barbosa Leal</u>, Researcher, Forschungszentrum Julich, Germany, Stephan Blossfeld, Researcher, Forschungszentrum Julich, Germany, Sylvia Morais de Sousa, Researcher, Embrapa Maize and Sorghum, Brazil, Kerstin A. Nagel, Researcher, Forschungszentrum Julich, Germany & Nicolai David Jablonowski, Researcher, Forschungszentrum Julich, Germany. Sorghum Root Architecture Subjected to Biogas-Digestate Application.</p> <p>3. <u>Ekaterina Nadezhkina</u>, Ph.D. Student, Russian State Agrarian Correspondence University, Russia, Elena Nadezhkina, Professor, National Research University, Russia & Valeria Vikhrev, Professor, Penza State Agricultural Academy, Russia. The Influence of Selenium on Winter Wheat Resistance to Herbicide Activity.</p>	<p>1. <u>David Ayala-Cabrera</u>, Ph.D. Student, FlUng - IMM, Universitat Politècnica de Valencia, Spain, Silvia J. Ocana-Levario, Ph.D. Student, Joaquín Izquierdo, Professor & Rafael Perez-Garcia, Professor, FlUng - IMM, Universitat Politècnica de València, Spain. 3D Representation of (Buried) Water Supply Elements Using Pre-processed GPR Images.</p> <p>2. <u>Tolga Sariyer</u>, Research Assistant, Canakkale 18 Mart University, Turkey & Canan Oztokat Kuzucu, Assistant Professor, Canakkale 18 Mart University, Turkey. Effects of Proline Applications on Yield and Quality Parameters in Kapija Pepper Grown Under Different Irrigation Levels-2.</p> <p>3. <u>Mohammad Ali Bahmanyar</u>, Scientific Member, Sari Agricultural Sciences and Natural Resources University, Iran, Ali Zalekani, MSc. Student, Sari Agricultural Sciences and Natural Resources University, Iran & Mehdi Ghajar Sepanlou, Scientific Member, Sari Agricultural Sciences and Natural Resources University, Iran. Effect of Application Waste Water on Heavy Metals (Pb, Cr, Cd, Ni) Contents in Different Parts of Rice (<i>Oryza Sativa</i> L.) Plant.</p>

15:30-17:00 Session XXI (ROOM B): Policies, Organizations and Planting Systems III	15:30-17:00 Session XXII (ROOM A): Animal and Fishery Sciences, Health and Toxicology III
Chair: Margarita Gisela Pena-Ortega, Professor and Researcher, Chapingo Autonomous University, Mexico.	Chair: Daniela Piaz Barbosa Leal, Researcher, Forschungszentrum Jülich, Germany.
<ol style="list-style-type: none"> 1. <u>*Thomas Akuja</u>, Associate Professor, South Eastern Kenya University, Kenya, F.L. Mkandawire, Lecturer, University Eastern Africa, Kenya, E.M. Njoka, Professor, Kenya Methodist University, Kenya & R.K. Obura, Professor, Laikipia University, Kenya. Effect of Planting Systems on the Growth and Yield of Bambaranut (<i>Vigna Subterranean l. Verdic</i>) Intercropped with Maize (<i>Zea Mays l.</i>). 2. <u>Flavia Maria de Mello Bliska</u>, Researcher, Agronomic Institute of Campinas, Brazil, Antonio Bliska Junior, Researcher, Agronomic Institute of Campinas, Brazil, Ricardo Firetti, Researcher, Regional Pole of Technological Development of Agribusiness, Brazil, Patricia Helena Nogueira Turco, Researcher, Regional Pole of Technological Development of Agribusiness, Brazil, Fabio Ricardo Ferreira Correa, Undergraduate Student, Sao Paulo State University, Brazil & Felipe Augusto Batoni de Souza, Agronomic Institute of Campinas, Brazil. Quality Management Level of Brazilian Coffee Business in Productive Regions. 3. <u>Jaime Araya</u>, Full Professor, University of Chile, Chile, Amanda Huerta, Associate Professor, University of Chile, Chile, Italo Chiffelle, Assistant Professor, University of Chile, Chile, Laura Araya, Student Assistant, University of Chile, Chile & Manuel Celis, Student Assistant, University of Chile, Chile. Proximal Analysis and Insecticide Effect of <i>Cestrum Parqui</i> (Solanaceae) Leaf Extracts on Elm Leaf Beetle Adults. 	<ol style="list-style-type: none"> 1. <u>Aitbay Bulashev</u>, Professor, Seifullin Kazakh Agro-Technical University, Kazakhstan & Zhanbolat Suranshiev, Head, Seifullin Kazakh Agro-Technical University, Kazakhstan. Using <i>Brucella Abortus</i> Outer Membrane Proteins in Serodiagnosis of Brucellosis. 2. <u>Svatoslav Hluchy</u>, Professor, Slovak University of Agriculture in Nitra, Slovakia & Robert Toman, Associate Professor, Slovak University of Agriculture in Nitra, Slovakia. Transmission Electron Microscopic Analysis of Smooth Endoplasmic Reticulum of Mammary Secretory Cells in Rabbits during Lactation and Regression Stages. 3. <u>Robert Toman</u>, Associate Professor, Slovak University of Agriculture in Nitra, Slovakia, Svatoslav Hluchy, Professor & Zuzana Hajkova, Ph.D .Student, Slovak University of Agriculture in Nitra, Slovakia. Effect of Separate Diazinon Administration and Co-Administration with Selenium and Cadmium on their Tissues Concentrations in Rats. 4. <u>Dildeep Varadan</u>, Assistant Professor, Kerala Veterinary and Animal Sciences University, India, Babitha Vazhoor, Assistant Professor, Kerala Veterinary and Animal Sciences University, India, R.S. Dass, Principal Scientist, Deemed University, India & A.K. Garg, Principal Scientist, Deemed University, India. Ameliorative Effect of Dietary Zinc and Rumen Protected DL-Methionine on Nitrogen, Calcium and Lead Retention Alterations Induced by Lead Toxicity in Goats.

17:30-20:00 Urban Walk (Details during registration)

20:30- 22:00 Dinner (Details during registration)

Wednesday 15 July 2015
Cruise: (Details during registration)

Thursday 16 July 2015
Delphi Visit: (Details during registration)

Zehra Tugba Abaci

Assistant Professor, Ardahan University, Turkey

Emre Sevindik

Assistant Professor, Adnan Menderes University, Turkey

Fatih Coskun

Assistant Professor, Balikesir University, Turkey

Muaviz Ayvaz

Assistant Professor, Adnan Menderes University, Turkey

Huseyin Uysal

Assistant Professor, Adnan Menderes University, Turkey

&

M. Kemal Avci

Research Assistant, Adnan Menderes University, Turkey

**Molecular Systematic Relation ndhF (cpDNA) some of
Silene L. Taxa Belonging Auriculatae and Brachypodeae
Section Spread in Turkey**

In this study seventeen individuals from *Silene* L. (Caryophyllaceae) genus were analyzed by using sequences of the ndhF (cpDNA). For the first time, total genomic DNA was isolated from healthy leaves of each individual collected from different localities of Turkey. Amplification of the entire ndhF region was performed by using primers with the aid of the polymerase chain reaction (PCR). Bootstrap trees were constructed based on ndhF sequences to elucidate the phylogenetic relationships among the investigated taxa. The ndhF data set consists of 17 taxa with 655 aligned characters. Parsimony analysis revealed 585 constant, 28 variable and 42 informative characters. Result of phylogenetic analyses were formed four clades. Clade A, comprises two species (*S.lucida* and *S.erimicana*), with an overall bootstrap value of 64%. Clade B, comprises four species (*S.araratica* subsp. *araratica*, *S.brevicaulis*, *S.rhynchoarpa* and *S.azirensis*) with an overall bootstrap value of 61%. Clade C, comprises two species (*S.caucasica* and *S.inclinata*) with an overall bootstrap value of 85% and Clade D, comprises three species (*S.balansae*, *S.fenzlii* and *S.leptoclada*) with an overall bootstrap value of 100%.

Anas Abusada

Researcher, Wageningen University, The Netherlands
&

Jeroen Warner

Wageningen University, The Netherlands

The Development of a Scientific Plan for the Development of the Agricultural Chain of Production in Palestine

This paper discusses the development of a scientific plan for the development of the agricultural chain of production in Palestine, in light of the severe existing circumstances (e.g. occupation, water scarcity, flood risk, service breakdown, etc.), specially in the main agricultural sector (i.e. plant of vegetables, trees, grains, etc.). We will identify the key factors that achieving optimum agricultural production, good financial revenues, social equity and better environmental impact, which all will secure providing food security to all.

Among many other factors, the following factors play significant roles in the agricultural chain of production:

Agricultural and cultivated lands, potable water for irrigation of cultivated plants, the manpower (farmers), equipments, fertilizers / pesticides, agricultural product itself, agricultural awareness in both governmental and private contents (marketing and management organizations) and last but not the least, the infrastructure of the rural areas (where are the farmers communities), e.g. schools, hospitals, health centers, etc.

Studying these factors from different aspects (status) and the improvement to achieve significant quality, including their social, economic and environmental impacts, will be the theme of this research. Indicating and examining the constraints and challenges on the agricultural chain of production in Palestine are an integral part of the development plan of this research.

The study will be concluded by applying a scientific survey among the focus groups and will depend on a statistical methods.

Spiro Adamopoulos

Chief Executive Officer, Agricultural Levies Institute of Australia,
Australia

**Factors Determining Public Good and National Interest
Policy in the Australian Agricultural Sector**

The Australian agricultural sector is considered one of the most productive and disease free industries in the world. Undertaking research, production and allowing new agricultural industries into Australia requires a robust process of defining what is in Australia's 'National Interest' and which aspects of agriculture are, or should be assisted and defined as being a 'Public Good'.

Defining what is in the 'National Interest' can be influenced by political pressures and other public policy. It can be argued that within agriculture the imposition of levies and taxes, expenditure on research and development and the quarantine measures needed to protect farmers from imports or new industries changes with the political views of time and the pressure placed on political parties.

This paper will establish that a series of clearly defined criteria should be used to determine what is in the National Interest and whether an industry or part of an industry can be classed as being a public good asset.

Hassan Ahmadi

Faculty Member, Islamic Azad University, Roudehen Branch, Iran

Effect of Upstream Slope and Curvature of Spillway Crest on Occurrence of Cavitation on Ogee Spillways

A study was conducted aiming at examining the effect of upstream slope and curvature of spillway crest on pressure distribution and possible occurrence of cavitation on the spillway by using mathematical models and computer solution in order to achieve the best analysis of the flow passing over the spillway. FLUENT software and VOF method were used for numerical modeling of the flow within the limits of spillway and calculation of free surface. The laboratory data published by USACE is considered as a criterion for validation of numerical model. After evaluation and ensuring the accurate performance of numerical model, the effect of upstream slope and curvature of spillway crest on the hydraulic performance of Ogee spillway was discussed on a 2D basis. While making different models with crest upstream slope and curvature for different hydraulic heads, performance of Ogee spillway was examined through the study of changes in pressure and water surface, velocity con-tours and cavitation index change. Study of information revealed that the change in upstream slope and curvature of spillway Ogee crest has a significant effect on the changes of cavitation index in the upstream limits of spillway, in the manner that by the decrease of slope and upstream curvature of spillway crest, an increase in the water flow velocity on the spillway surface was observed. The effect of this change was followed by more negative pressure and decrease of cavitation index in the upstream limits of spillway.

Thomas Akuja

Associate Professor, South Eastern Kenya University, Kenya

F.L. Mkandawire

Lecturer, University Eastern Africa, Kenya

E.M. Njoka

Professor, Kenya Methodist University, Kenya

&

R.K. Obura

Professor, Laikipia University, Kenya

Effect of Planting Systems on the Growth and Yield of Bambaranut (*Vigna Subterranean l. Verdic*) Intercropped with Maize (*Zea Mays l.*)

Experiments were set up to evaluate the effect of planting system on the growth and yield of bambaranuts (*Vigna subterranea L. Verdec*) intercropped with maize. Three intercropping planting systems were used: monocropped bambaranuts, intercropped bambaranuts with maize and monocropped maize. The objectives of the study were to determine resource use efficiency, grain and pod yield, evaluate the various allometric relationships and identify the optimal intercropping combination between bambaranut and maize. Bambaranuts were planted in 1:1 alternate rows of maize and at various population densities/spacing. The spacings for bambaranuts were varied at 45, 35, 30, 25 and 15 cm giving population densities of 76190, 95235, 114285, 133333 and 222222 plant ha⁻¹, respectively, while spacing for maize was constant at 30 x 75 cm at the population density of 45714 plants/ha for all plots. Bambaranut landrace KK204 developed at Kenya Agricultural Research Institute (KARI) now part of Kenya Agricultural and Livestock Research Organisation (KALRO), Kakamega was used for the study. The experiment was replicated three (3) times and planted for three (3) seasons. A medium maturing maize variety Hybrid H513 was sown at the constant intra- and inter-row spacing of 30 x 75 cm. Data on growth was collected at 25, 40, 86 and 95 days after sowing (DAS). Yield was calculated from the sampled harvestable area during final harvest. Data analysis was done by SAS to generate ANOVA tables for the various treatment means and Tukey multiple range test was used to determine the sensitivity of treatment means. Plant height, canopy spread, number of plants/unit area, soil and ambient temperature, soil nutrition, bambaranut pod and grain yield, grain yield of maize shelling percentage LER, ATER, RY, IER, MA and SPI were either measured or evaluated. Significant ($P \geq 0.05$) differences for both mono- and intercropped bambaranuts for soil and ambient temperature;

number of plants and canopy spread at 25, 40, 90 and 115 DAS; weight of pods/plant; pod and grain yield, IER, MA and SPI for 2006/07, 2007/08 and 2008/09 growing seasons; shelling %, LER and ATER for 2006/07 and 2007/08 growing seasons; relative yield (RY) for 2007/08 and 2008/09. Maize showed significant ($P \leq 0.05$) differences for both mono- and those intercropped with bambaranuts for cob length, average plant height, shelling %, grain yield/ha for 2006/07 and 2007/09 growing seasons, RY and IER for 2006/07 and 2007/08 growing seasons. Soil temperature was always lower than ambient temperature throughout the study period. The number of plants decreased with the period of growth because of deaths, canopy spread increased with increased days of plant growth. Pod and grain yield of bambaranuts intercropped with maize were depressed except during 2007/2008 growing season when the crop of maize did poorly at Kakamega because of an attack by leaf blight.

Mohammad Ali Bahmanyar

Scientific Member, Sari Agricultural Sciences and Natural Resources
University, Iran

Ali Zalekani

MSc. Student, Sari Agricultural Sciences and Natural Resources
University, Iran

&

Mehdi Ghajar Sepanlou

Scientific Member, Sari Agricultural Sciences and Natural Resources
University, Iran

Effect of Application Waste Water on Heavy Metals (Pb, Cr, Cd, Ni) Contents in Different Parts of Rice (*Oryza Sativa* L.) Plant

In order to investigate the influence of application waste water (mixed with river water) on concentration of heavy metals in root, shoot and grains of rice (*Oryza sativa* L.) an experiment was conducted during 2014. The concentration of heavy metals including lead (Pb), chrome (Cr), cadmium (Cd) and nickel (Ni) in river water, waste water (Arian Sina Co., Sari, Iran) and irrigation water (river water mixed with waste water (1:1 v/v)) was determined. Results indicated that concentration of Pb, Cr, Cd and Ni in plants irrigated with mixed water were significantly greater (by 44, 36, 50 and 72 percent, respectively) compared to those grown in river water alone (control). The amounts of heavy metals increased in all parts of rice (root, shoot and grains) where mixed water was given. Concentration of heavy metals in root, however, was more than either shoot or grains. In rice grains, the concentration of Cr increased by 88% more than other heavy metals as compared to the control. Transport index of heavy metals from soil to root were more than shoot to grain.

Jaime Araya

Full Professor, University of Chile, Chile

Amanda Huerta

Associate Professor, University of Chile, Chile

Italo Chiffelle

Assistant Professor, University of Chile, Chile

Laura Araya

Student Assistant, University of Chile, Chile

&

Manuel Celis

Student Assistant, University of Chile, Chile

Proximal Analysis and Insecticide Effect of *Cestrum Parqui* (Solanaceae) Leaf Extracts on Elm Leaf Beetle Adults

The elm leaf beetle, *Xanthogaleruca luteola* Müller (Coleoptera: Chrysomelidae), skeletonises the leaves of ornamental *Ulmus* spp. trees that can be defoliated completely. Proximal analysis and insecticide effects of water and ethanol extracts from new and mature leaves obtained with water and ethanol from *Cestrum parqui* L'Héritier (Solanaceae), an evergreen plant endemic in Chile, were evaluated at various concentrations on the elm leaf beetle in the laboratory, in a completely randomized bioassay considering two leaf maturity stages and solvents. Also, the LC₅₀ and LT₅₀ were determined for each leaf mature stage and solvent. The proximal analysis revealed differences in contents of ashes, protein, lipids and humidity. The order of decreasing effectiveness (LC₅₀ and LT₅₀) of the insecticide extracts was: new leaves-ethanol, new leaves-water, mature leaves-ethanol, and mature leaves-water. This bioinsecticide from the leaves of *C. parqui* indicates an interesting opportunity for use in integrated pest management of *X. luteola*.

David Ayala-Cabrera

Ph.D. Student, FluIng – IMM, Universitat Politècnica de Valencia,
Spain

Silvia J. Ocana-Levario

Ph.D. Student, FluIng – IMM, Universitat Politècnica de Valencia,
Spain

Joaquín Izquierdo

Professor, FluIng – IMM, Universitat Politècnica de València, Spain
&

Rafael Perez-Garcia

Professor, FluIng – IMM, Universitat Politècnica de València, Spain

3D Representation of (Buried) Water Supply Elements Using Preprocessed GPR Images

Data obtained after the inclusion of certain technologies is expected to improve decision-making processes, specifically about the actions to propose for the assets of public services (e.g. water supply systems – WSS). In this sense, non-destructive methods have shown to be interesting techniques that support network components assessment without affecting the surrounding environment conditions. However, the huge volume and the difficulty of interpretation of the generated information, together with continuous network growth (population increase), maintenance activities, etc., greatly impair the power of these tools. These aspects constitute the main reasons for some technologies not to have been included efficiently in WSS management so far.

In this paper, ground penetrating radar (GPR) is used as a non-destructive method to assess the buried components of WSSs. The aim is the detection of various pipe materials (such as plastic and metallic, among others), and the identification of other important characteristics (e.g. water leakage). This work seeks to use the visualization advantages of the subsoil characteristics provided by pre-processed GPR images. These features, which are represented as anomalies into the images, are extracted and merged to generate 3D models. The 3D representations obtained facilitate elucidation by personnel non-highly skillful in the interpretation of data from non-destructive techniques. The work is performed on GPR images of WSS pipes taken at strategic locations of urban environments. The goal is to promote the use of these technologies in WSS intended to generate relevant information that allows adequate and dynamic technical management of these systems. Results and analyses are presented in this paper.

Melissa Baker

Lecturer, University of South Africa, South Africa

&

Kevin Mearns

Professor, University of South Africa, South Africa

Using Sustainable Tourism Indicators to Manage Scarce Water Resources in the Namibian Tourism Industry: the Case of two Wilderness Safaris Camps in Namibia

Over the last five decades global water usage has tripled (Gelick, 2003; Carbon Disclosure Project, 2010). It is argued that half a billion people currently live in water-stressed or water scarce countries, and it is predicated that by 2025 the number will increase to three billion due to an increase in population growth (Hanjra & Qureshi, 2010). The challenge to conserve, manage and utilize the earth's scarce water resources in a more efficient and sustainable manner has emerged as one of the greatest global environmental challenges. The growth in water scarcities world-wide, together with an increase in wastewater effluents have become a growing reality within every sector of society and are fast becoming an environmental, social and economic concern (Bagatin *et al.*, 2014). This concern also needs to be addressed within Southern Africa's growing tourism industry.

The tourism industry is one of the fastest growing industries worldwide and its role as a fundamental contributor to the economic sector cannot be understated. At present it is the world's largest industry (Bricker *et al.*, 2013, 3). However this growth has led to an increase in negative environmental impacts. Due to the nature of the tourism industry and the products it offers, it is often situated close to or within delicate ecosystems. The rapid expansion of the industry within these delicate ecosystems has ultimately placed the natural environment and its limited resources in a very vulnerable position. Water forms one of the most basic yet vital natural resources needed for a tourism venture to function. Any change in the availability of water resources and or the quality of a destination's water resource can pose a detrimental threat to the tourism venture (Gossling *et al.*, 2012). This is especially true within semi-arid regions such as Namibia and South Africa. According to Gossling *et al.* (2012) "In the future tourism in many regions will face considerably greater problems with regard to water availability and quality due to increasing water use and climate change, as these changes are likely to affect individual tourism ventures in water scarce regions." There is currently a lack of knowledge about the degree of these impacts and this suggests that there is a need to

determine the extent of such impacts in order to mitigate them effectively. Water use within the tourism industry is under investigated as there is no specific regional or national water use statistics for the tourism industry or tourism-related activities.

The worldwide drive toward sustainable development and the growth in environmental awareness has placed pressure on tourism ventures from governments, policy makers and tourist to measure and mitigate their environmental impacts; water use forms one of the fundamental environmental issues which must be addressed. This paper focuses on presenting the way in which sustainable tourism indicators can be used to effectively measure tourism ventures water use, management and conservation strategies. This paper presents the results of a study that was conducted in Namibia on two safari camps owned by the company Wilderness Safaris, situated on the border of the Namib Desert. The study is based on empirical research and employed a mixed methods approach in order to facilitate triangulation. This was primarily done to improve the validity of the study's findings. This is confirmed by Fin *et al.* (2000, 81), who goes on to state that "the use of a combination of methods will be used because of the complexity of phenomena and to triangulate to improve validity".

Tiberius Balaes

Researcher, Alexandru Ioan Cuza University of Iasi, Romania

&

Catalin Tanase

Professor, Alexandru Ioan Cuza University of Iasi, Romania

Gnicolous Basidiomycete Species Adapted for Biocontrol of Nematodes

The study is aimed at investigating the potential of some basidiomycete species for biocontrol of telluric nematodes, a subject less approached internationally. Saprotrophic fungi are adapted for different survival strategies involving biological and biochemical mechanisms for a diversified nutrition. Saprophytic lignicolous basidiomycete species degrade dead organic substrates of plant origin, but can adapt their nutrition strategies for consuming nematodes as sources of nutrients, when exposed to nutritive stress. This property confers the basidiomycete species potential to be used in biocontrol strategies. For this purpose, 69 species of basidiomycete isolated in pure culture were grown on low nutrient media to test their potential of colonization the nematodes' bodies. 35 out of 69 fungal species proved potential of colonizing and degrading nematodes' bodies. Further, 6 species were chosen to be tested on different variants of media, for optimizing the process and establishing the way of action. Both biological and biochemical mechanisms are involved in the colonizing process, these mechanisms being different from a species to another. The possibility of using filamentous fungi for biocontrol of telluric phytopathogens opens a new perspective for preventing and controlling pathogens through alternative, without sides-effects, methods.

Saziye Balku

Associate Professor, Atilim University, Turkey

Magdi Buaisha

Ph.D. Student, Atilim University, Turkey

&

Seniz Ozalp Yaman

Associate Professor, Atilim University, Turkey

An Optimum Design for Activated Sludge Systems

High costs of construction, maintenance and operation of waste water treatment systems exert economic pressure, even in developed countries. Therefore, engineers look for creative, cost-effective environmentally sound ways to control pollution. In this study, it is presented how an optimization algorithm can be used to determine the design parameters of an activated sludge system which make cost minimum. The cost of an investment can be analyzed in two categories: fixed capital investment and operational costs. For an activated sludge system, the former consists of aeration tank, settling tank, pumps, piping system, aeration system and scraper constructions, whereas the latter mainly involves energy costs which include aeration and sludge removal when labor or non-operational expenditures are ignored. A simulation algorithm in which an optimization subprogram is used to calculate the design parameters of an activated sludge system is presented in this study. For a defined inlet flow rate and characteristics of wastewater and the desired outlet characteristics, optimum design parameters can be determined using the proposed algorithm. In modeling, the Activated Sludge Model No.3 and Takacs settling model, during execution of the simulations, Matlab®, and "fmincon", an optimization algorithm based on sequential quadratic programming have been used with some improvements. Proposed algorithm can be utilized as a good design tool for activated sludge systems. In order to avoid the irrelevant results, sludge retention time and hydraulic retention time are added to the constraints and algorithm is run with various initial guesses. The best result is achieved when initial guess of 1.0 is assigned to all the variables. Results show that objective function, volume of aeration tank, settler area, recycle ratio, and waste ratio can be lowered by 38.20, 26.79 %, 49.21 %, 20.90 %, and 44.42 % respectively, however oxygen transfer rate is 12.11 % higher than that of predefined one.

Slimane Bedrani

Professor, Ecole Nationale Supérieure Agronomique, Algeria

Food Security in Algeria

After recalling the main definitions of family farming and having opted for the one that seems the most operational, we show that family farming largely dominates the agricultural sector in Algeria since it brings together more than 97% of farms and covers more than 93% of useful agricultural land. We then examine the main policies that encouraged the development of family farming (creation of farms on public land, overvalued exchange rate that favoured the farm equipment, support to farm investments and the use of modern inputs, development of multi activity and improvement of living conditions in rural areas) and the main factors that hindered - on the contrary - its development (rural exodus, land insecurity and lack of access to irrigation water, difficulties in obtaining state aid, poor access to bank financing).

Inta Belogradova

Researcher, Institute of Biology, University of Latvia, Latvia

Dace Grauda

Associate Professor and Leading Researcher, University of Latvia,
Latvia

&

Isaak Rashal

Head of the Laboratory, University of Latvia, Latvia

Molecular Methods of Investigation Species of Genetic Diversity Determination in the Urban Area Riga, Latvia

Genetic particularities of populations might define the differences in environmental response. For research of impact of urban conditions selection of species wide grown in different environmental conditions are crucial. The lime trees often are planted in urban areas of Central Europe, also in the urban territories of Riga, capital of Latvia. The white clover is cultivated worldwide and was naturalized in many countries growing in meadows, yards, gardens, along roads and streets etc., especially in temperate regions. It is widespread in grasslands throughout Riga. The goal of this study was to investigate genetic variation in Riga urban populations of lime trees (*Tillia* sp.) and white clover in comparison with some wild Latvian populations. In general, for ecological investigations of genetic diversity it is important to have a rather simple method, which gives a possibility to analyse high number of polymorphic loci of samples collected in appropriate time. Therefore for genetic diversity studies were chosen analysis of universal retrotransposon based IRAP (Inter-Retrotransposon Amplified Polymorphism) molecular markers, which was already successfully used for investigation of genetic diversity of several species. The method allows revealing high level of genetic diversity and it is cost and labour effective. The plant material (leaves fast dried by silicogel) of both species was collected in different regions of Riga and in several non-urban areas of Latvia. DNA of white clover was isolated by 1% CTAB (cetyltrimet-ammonium bromide) buffer DNA extraction procedure. DNA of lime trees was isolated by standard NucleoSpin® Plant II protocol. More than 50 polymorphic loci were analysed of the each species. BD FACSJazz® cell sorter (BD Biosciences, USA) were used for evaluation of ploidy level of investigated plants. In presentation differences of genetic variation depending on environmental conditions of populations of both species will be analysed.

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Lavinia-Mariana Berca

Postdoctoral Researcher, University of Agronomic Science and
Veterinary Medicine, Romania

&

Stelica Cristea

Professor, University of Agronomic Science and Veterinary Medicine,
Romania

The Distribution of *Alternaria* sp. on *Brassica napus* and *Sinapis* sp. from the South Region of Romania

Alternaria sp. is a diverse group of pathogenic and saprophytic fungi, often found in conjunction.

The aim of this study was to estimate the distribution of six *Alternaria* sp. present in infected seeds samples taken directly from eight fields from Calarasi county.

Five samples of *Brassica napus* and five samples of *Sinapis* sp. seeds were taken directly from growing fields in June, just prior to harvest. Three replicates for each samples were performed. Five seeds were incubated in Petri dishes (ø 10 cm) on potato dextrose agar for each replicate. The fungi presence on seeds was evaluate after incubation for 10 days, at 22 °C. A few semi-permanent slides were performed from each colony and were examined under a microscope (x40), field by field, until a total of 50 conidia of *Alternaria brassicae*, *Alternaria brassicicola*, *Alternaria radicinum*, *Alternaria dauci*, *Alternaria solani* and *Alternaria tenuis* have been identified.

The distribution of *Alternaria* sp. was compared with Chi2 or Fisher test ($p < 0.05$ was considered significant).

Analysis of the data obtained after microscopic analysis of samples showed that the *Alternaria brassicicola* (~60%) and *A. brassicae* (15%) represent the most frequent species identified on *Brassica napus*. The *Alternaria brassicicola* (~52%) and *A. brassicae* (19%) are also the most frequent species of *Alternaria* found on *Sinapis* sp. seeds. The overall distribution of all *Alternaria* sp. identified on *Brassica napus* and *Sinapis* sp. seeds was different ($p < 0.05$). These results demonstrated that the mixed infections with *Alternaria* species are common events on investigated agricultural areas and support the variable affinity of *Alternaria* sp. for host.

In conclusion our results indicated a significant dispersion of several members of *Alternaria* sp. on seeds from investigated area.

Asbjorn Bergheim

Senior Researcher, IRIS – International Research Institute of Stavanger,
Norway

&

Arve Nilsen

NVI – Norwegian Veterinary Institute, Norway

Intensification of Salmonid Aquaculture

Commercial scale production of salmon and trout has only lasted for 30 – 40 years. Over this period, a remarkable progress took place within vital fields, such as genetics, nutrition and medicines, and not, least, a revolution regarding engineering and farm management. This presentation emphasizes intensification attempts of the production from the fry stage to harvest made possible by introduction of new technology and alternative farming regimes.

In land-based farming of smolt, launching of oxygen (DO) injection has reduced the water consumption by some 75% and even further to 90% while combining oxygenation and stripping of carbon dioxide (CO₂) in the tanks. Such combined water treatment is indicated 'partial recirculating aquaculture system (partial RAS)' and is at present the dominating system for smolt production in Norway. A vital contribution is development of efficient technology removing 60 – 90 % CO₂ per flow passage. Fully RAS, also including biofiltration, is rapidly expanding in most salmonid producing countries and is now representing more than half of the total smolt production in Chile. Such highly producing systems means improved sustainability in terms of strongly reduced water consumption and lower effluent loading due to particle removal and sludge utilization.

The traditional transfer of smolt (50-100 g) to sea cages is gradually being replaced by production of so-called super-smolt of 500 – 1,000 g in land-based RAS or in closed floating cages before stocking in open cages. This extended 'smolt stage' results in a shorter production cycle, less sea lice and disease problems (e.g. infectious pancreas necrosis) and reduced discharge of feed-based wastes.

Milena Bozhilova-Sakova

Ph.D. Student, University of Forestry, Bulgaria

PCR-RFLP Analysis of CAST Gene in one Bulgarian Sheep Breed

The aim of present study was investigation and identification of allelic variants of CAST gene associated with meat traits in sheep. The material involved one population of 25 animals of Bulgarian breed Karakachaninan sheep – 22 ewes and 3 rams. Genomic DNA was extracted in order to estimate calpastatin genotypes by means of PCR amplification and PCR-RFLP method. The PCR products were digested with *MspI* restriction enzyme. In the total population of sheep polymorphism was not found. The CAST locus was monomorphic.

Eva Bozsik

Ph.D. Student, University of Debrecen, Hungary

Janos Raso

Research Assistant, National Agricultural Research and Innovation
Centre, Hungary

Peter Riczu

Research Assistant, University of Debrecen, Hungary

Bernadett Galya

Ph.D. Student, University of Debrecen, Hungary

Imre Csiha

Station Manager, National Agricultural Research and Innovation
Centre, Hungary

&

Janos Tamas

Head and Professor, Institute of Water and Environmental
Management and University of Debrecen, Hungary

Evaluation of Afforestation Possibilities in One Part of the Great Hungarian Plain

The regional growth of arable land had a significant effect on European landuse in last decades, thereby it has radically reduced the coverage of natural forest. However, this cause conflicts of interest between the agricultural and forestry sectors. The Hungarian national stock of forest area is 1,9 million hectares, of which 12% is located in agricultural lowland areas. The Great Hungarian Plain has got less favoured soil conditions (salinization, extreme water management, soil structural degradation) which resulted limited conditions for the conventional, large area extend agricultural production. Although these less favoured soil condition not the best habitat conditions for the trees too, but still the more favourable areas, patches have been typically utilized for grazing and forestation for hundred years.

In this case study we would like to evaluate an afforested are in one part of Great Hungarian Plain. The study area is located in the East part of Hungary, part of Forest Research Institute in Püspökladány. This Institute was founded in 1924, and the aim was to elaborate methods of tree planting on lowland areas, especially saline or deep regions. During our study we evaluate the results of afforestation – based on various criteria – with integration of the traditional survey methods and remote sensing technologies (airborne hyperspectral and airborne LiDAR data).

Aitbay Bulashev

Professor, Seifullin Kazakh Agro-Technical University, Kazakhstan
&

Zhanbolat Suranshiev

Head, Seifullin Kazakh Agro-Technical University, Kazakhstan

Using *Brucella Abortus* Outer Membrane Proteins in Serodiagnosis of Brucellosis

Epizootic and epidemic situation on brucellosis in the Republic of Kazakhstan remains very tense. Effectiveness of brucellosis eradication measures is largely dependent on the reliability of the serological methods. Currently ELISA-kits based on lipopolysaccharides (LPS) of *Brucella abortus* are used in Kazakhstan. It is well known that LPS cause cross-reactions between gram-negative microorganisms. It is no accidentally, the number of animals reacting positively to brucellosis increased sharply with the introduction of ELISA into practice, but the improvement of the epizootic situation did not occur. In this regard, the search for more specific antigens and development of new ELISA-tests are very important issues for Veterinary Medicine of Kazakhstan and other countries of Central Asia where brucellosis is widespread.

We are developing a new approach in serological diagnosis of bovine brucellosis based on using in ELISA a more specific component of pathogen, i.e. *Brucella abortus* outer membrane proteins (OMP). The essence of the proposed approach is as follows. The solid phase of polystyrene plate is coated with antigen by two methods: 1) directly with OMP isolated from *B. abortus* 19; 2) by the selection of OMP from pathogen's ultrasonic preparation (USP) with the help of monoclonal antibodies (mAb), immobilized to the solid phase.

The first method was tested in comparison with conventional serological tests. Serum samples assays of 1041 cows showed the presence of specific antibodies by AT, CFT and ELISA with *B. abortus* 19 whole cells in 27 (2.6%), 22 (2.1%) and 45 (4.3%) heads, respectively, whereas the new method diagnosed brucellosis in 60 (5.7%) animals. At the same time, it fully confirmed positive results of all classical tests and allowed to identify specific antibodies additionally in 15 (1.4%) cows.

The basic reagent of the second option of ELISA are mAb specific to the epitope of *B. abortus* 19 OMP with a molecular mass of 50 kDa. Mab were tested in a sandwich-ELISA as "capture" antibodies in serological assays of 1483 cows. Positive results of AT and CFT were registered in 21 (1.4%) and 19 (1.28%) heads, whereas sandwich-immunoassay identified the presence of antibodies against the pathogen in 37 (2.49%) animals. It should be noted that ELISA did not detect specific antibodies in the sera samples of 10 cows reacted positively to

brucellosis by AT or CFT. Sandwich-ELISA was more efficient than its indirect version where Brucellosis unified antigen (BUA), USP and LPS were used as antigens. For instance, sandwich-immunoassay was 6.3 and 2.1 times more sensitive than indirect-ELISA with BUA and USP, respectively, by the results of testing cows from brucellosis affected farms. It is essential to note that the number of animals positive for brucellosis by indirect-immunoassay with LPS was 1.4 times greater in comparison with the results of sandwich-ELISA. This "advantage" can be explained by the presence of antibodies cross-reacting with LPS in the blood serum of healthy animals. Thus, *Brucella* OMP possess a higher diagnostic value than LPS in serological diagnosis of brucellosis.

Makhosi Buthelezi

Researcher, Mangosuthu University of Technology, South Africa

Desmond Conlong

Senior Entomologist, Senior Lecturer, South African Sugarcane

Research Institute, 2 University of KwaZulu-Natal, South Africa

&

Godfrey Zharare

Senior Lecturer, University of Zululand, South Africa

Seasonal Monitoring of the Incidence and Flight Activity of the Groundnut Leaf Miner (*Aproaerema* sp.) at Five Sites in South Africa

Groundnut leaf miner (GLM) has recently emerged as a major pest of groundnut (*Arachis hypogaea* L.) in Africa. The origin of this new pest is uncertain and there is also not much information on its ecology to facilitate the development of control strategies against it. The aim of the study was to monitor the infestation and flight activity of GLM in order to understand its dispersal and off-season survival tactics and to predict its initial occurrence. The study was conducted at five localities including Vaalharts, Manguzi, Brits, Bhekabantu and Nelspruit from November 2010 to December 2012. Pheromone traps were used to monitor the moth's flight activity. In the 2010/2011 season, larval infestation was monitored by scouting in groundnut crops grown at two planting dates (November 2010 and January 2011). In the 2011/2012 season, larval infestation was monitored by scouting in groundnut, soya bean, pigeon pea, lucerne and lablab bean crops grown at two planting dates (November 2011 and January 2012). Information collected included climatic data (rainfall, temperature and humidity) that were obtained from ARC weather stations placed at four planting sites. At all locations, GLM moths were caught in traps before crop planting. Though low in numbers, GLM moths were caught during winter at all locations other than Brits. Infestations on pigeon pea and lucerne were only observed in March and April 2012. No infestations were observed on lablab bean at any of the sites for the duration of the study. At Nelspruit there was a significant negative association between temperature and GLM moth catches in pheromone traps, whereas at Vaalharts, there was a significant positive association between humidity and GLM moth catches. There was no significant correlation between any of the recorded environmental factors and GLM moth catches at Manguzi and Brits.

Phineas Khazamula Chauke

Associate Professor, Head of Department Agricultural Economics and Agribusiness and Land Bank Chair of Agriculture School of Agriculture, University of Venda, South Africa

Teachers' Perceptions Regarding Curriculum Evolvment, Infrastructure Provision and Quality Enhancement in Limpopo Province, South Africa

This study was conducted in Limpopo Province of South Africa focusing on teachers of Agricultural Science. From a population of about 243 teachers, 88 who attended the Provincial conference arranged by the Association of South African Agricultural Educators participated in the study. The study aimed at responding to selected objectives, i.e. teachers' demographic characteristics, availability of land for agricultural purposes, Senior Certificate subject pass rates as provided by teachers and teacher's perceptions regarding, evolvement of subject content, teacher qualifications, quality of output and infrastructure support. A quantitative, multistage clustered but non-probability sampling design was employed to solicit responses from teachers. Data were collected through Likert scale questionnaires and analysed through non-parametric ordinal level statistical techniques, i.e. frequency and percentage distributions. The general findings of the study were that many teachers will remain in the education sector until formal retirement, requiring restructuring of professional qualifications towards a biased agricultural orientation. Also Teachers reported minimal support to effectively transmit practical knowledge to learners but saw no much value in such support, especially the provision of agricultural land due largely to many years of teaching within an environment that lacked basic infrastructure. The latter finding called for concerted efforts at exposing teachers to the value of acquiring practical skills and campaigns to attract the attention of implementing agents, policy makers and learner supply bases. Although pass rates have been increasing over the years at the grade 12 level, concerns were raised regarding the official low pass benchmark (commencing at about 30%) and its effect on quality of products emanating from the system.

WeiQi Chen

Professor, Xiamen University, China

Xinxin Wu

Graduate Student, Xiamen University, China

&

Luo-Ping Zhang

Professor, Xiamen University, China

Estimation of Marine Ecosystem Extrinsic Value

Marine ecosystem, as an indispensable component of the global life support system, not only plays an important role in improving global environment and maintaining ecological balance, but also provides an important support for human existence and development. In recent years, marine ecosystem is coming under increasing pressure from human activities. It is urgent to sustain biodiversity and ecosystem services through better management, valuation, measurement, conservation and restoration for attaining a healthy and productive ecosystem. This paper focuses on marine ecosystem extrinsic value, including theoretical analysis, estimation methods and case study.

Based on the relevant concepts of ecosystem extrinsic value, combining the characteristic of marine ecosystem, the paper defines the intrinsic value, the extrinsic value, the service value of marine ecosystem. After identifying various types of marine ecosystem services, it analyzes their relevance to ecosystem intrinsic value and extrinsic value, and reveals the connotation of marine ecosystem extrinsic value, and then preliminarily clarifies the relationships among marine ecosystem intrinsic value, extrinsic value, service value and marine ecosystem value.

Besides the alternative economic valuation approaches, emergy analysis is introduced to estimate some extrinsic value of marine ecosystem. Benefit transfer approach is mainly used in the case study of Xiamen Bay, China, accompanied by direct and indirect market approach, and emergy analysis. The research results show that the total extrinsic value of marine ecosystem in Xiamen Bay was 3283 million CNY in 2011. The extrinsic value for human subject was 2689 million CNY, accounting for 81.9% of the total extrinsic value, and the extrinsic value for other ecosystem subject was 594 million CNY, accounting for 18.1%. In the former, the aesthetic and entertainment value is largest; in the latter, the value of habitat and species diversity is dominant. The protection of marine ecosystem and the sustainable development of marine economy are also discussed.

Nesli Ciplak

Assistant Professor, University of Karabuk, Turkey

A Review of Decision Making Methods in Sustainable Waste Management

The purpose of this study is to review the types of decision making models that are currently being used in the area of waste management. Three main categories of decision making models have been identified with their benefits and limitations in this research. These are multi criteria decision analysis, cost-benefit analysis and life cycle analysis. Since the models are representatives of the real world with respect to the scope of study, none of them could encompass all the aspects of waste management cycle. At this point, for decisions to be effective it is necessary to set a balance between environmental sustainability, economically viability, technically soundness and the social acceptability of the system.

Stelica Cristea

Professor, University of Agronomic Sciences and Veterinary Medicine,
Romania Stefana Jurcoane

Professor, University of Agronomic Sciences and Veterinary Medicine,
Romania

Florentina Matei

Associate Professor, University of Agronomic Sciences and Veterinary
Medicine, Romania

Paul Dobre

Associate Professor, University of Agronomic Sciences and Veterinary
Medicine, Romania

Anibal Capuano

Technical Director, Camelina Company Espana S.l., Romania
&

Yuri H. Yambanis

General Director, Camelina Company Espana S.l., Romania

Camelina Pathology - Seed Mycoflora Extension

Camelina sativa is a sustainable bioenergy crop, which represents a promising feedstock for the biofuel industry, and especially for the biojet fuel industry. The research was driven, as a complementary activity, during the ITAKA FP7 European Programme, on cultivation of camelina varieties: Calena, GP202, GP204 and Camelia (Romanian variety) by identifying the camelina seeds mycopathogens within the specific of Romanian climate and environment. There were discovered the following pathogens: *Alternaria* sp., *Penicillium* sp., *Rhizopus* sp. and *Stemphylium* sp., fungi that can influence the camelina seed yields and germination process. From the four tested varieties, the Romanian Camelia variety of camelina sp. was recognized as the most resistant for aggressive influence with less species` infection (only *Rhizopus* sp. with 32% incidence and respectively for *Alternaria* sp. with 68%) than the other varieties: Calena, GP202 and GP204. *Stemphylium* sp. pathogens are determined in association with *Alternaria* sp. for Calena, GP202 and GP204 varieties and the *Penicillium* sp mycomycete had high incidence values on GP202 and GP204 varieties.

Alternaria sp pathogens was present on each camelina variety studied and the pathogens association *Alternaria* sp., *Penicillium* sp., *Rhizopus* sp., *Stemphylium* sp. determine the influence on seeds germination and further on the infection of next crops. More studies are required to select specific suitable treatments to describe the mycopathology on camelina seeds.

Flavia Maria de Mello Bliska

Researcher, Agronomic Institute of Campinas, Brazil

Antonio Bliska Junior

Researcher, Agronomic Institute of Campinas, Brazil

Ricardo Firetti

Researcher, Regional Pole of Technological Development of
Agribusiness, Brazil

Patricia Helena Nogueira Turco

Researcher, Regional Pole of Technological Development of
Agribusiness, Brazil

Fabio Ricardo Ferreira Correa

Undergraduate Student, Sao Paulo State University, Brazil
&

Felipe Augusto Batoni de Souza

Agronomic Institute of Campinas, Brazil

Quality Management Level of Brazilian Coffee Business in Productive Regions

The producer, or rural entrepreneur, spends much of his time and energy in the evaluation of technical issues related to agricultural production, especially in the execution of routine tasks, relegating to the background the administrative aspects of the activity. Thus, other important steps, such as planning and the acquisition of information, are affected, which can compromise the activity as a whole. Despite the large technical experience in cultivation, resulting from years of work, the business management is generally primitive and intuitive. The use of information is made empirically, and grounded in feelings. Decision making are little rational as they are not guided by methods that allow for the systematic reproduction processes. Empower the rural entrepreneurs to assimilate and apply concepts of competitiveness, quality and management, replacing the single profit expectation is a challenge for the coffee segment. In this context, this study identify the degree of management of coffee farms in Brazil, and assesses the profile the of quality management level of coffee business in the four main Brazilian coffee regions. We use the Identification Method of Management Degree, the MIGG-Coffee, which assists in gathering information addressed to the rural business manager to help improving business, turning it into an organized and profitable one. It uses a quick and easy to apply questionnaire in order to classify management activities into different organizational levels. It establishes nine levels of management, ranking from the most primary to the highest one considered as excellent. This method allows comparisons among companies, production processes, technological levels and regions. It assists in evaluating competitiveness

of local arrangements for sustainable regional development. Allows pointing out strengths and weaknesses and indicates corrective actions in maintaining and advancing processes quality. This study presents the scores for each respondent individually, for each evaluated criteria – leadership, strategy, planning, customers, society, information, knowledge, people, processes and results, the total score and the classification of the organization, according to the degree of management, obtained through questionnaires applied between 2013 and 2014. The results indicate that in regions dominated by family farms, with less access to technology and information, and low degree of organization of cooperatives and regional associations, management levels are, with few exceptions, lower than national average. In regions with predominance of modern technologies and regional cooperatives historically disclose information and technical assistance to producers, management levels are higher.

Nicola Decaro

Associate Professor, University of Bari, Italy

Leonardo Occhiogrosso

Post-doc, University of Bari, Italy

Mariastella Lucente

Post-doc, University of Bari, Italy

Viviana Mari

Post-doc, University of Bari, Italy

Gabriella Elia

Associate Professor, University of Bari, Italy

Eleonora Lorusso

Post-doc, University of Bari, Italy

&

Canio Buonavoglia

Professor, University of Bari, Italy

Emerging Pestiviruses and Impact on Animal Production

HoBi-like pestivirus represents an emerging group of pestiviruses infecting cattle, which have been detected in various parts of the world. Here, we report an outbreak of HoBi-like pestivirus infection in Italy that caused severe economic losses in terms of animal production. The outbreak occurred between August and September 2014 causing an abortion storm in pregnant cows and acute gastroenteritis in calves. A HoBi-like pestivirus strains was detected by nested-PCR and real-time PCR in aborted fetuses and faecal samples of diarrhoeic calves. In September 2014, an extensive eradication program was started which involved the entire cattle herd. In order to bleed all animals of the herd, samples collection was performed under our supervision. Virological investigations were carried out on a total of 780 animals that were sampled twice at 30 days of distance by collecting EDTA-blood samples. All blood samples were tested for HoBi-like pestivirus by nested-PCR and real-time RT-PCR. Animals were considered persistently infected (PI) when they were found to be viremic at both sampling times; in contrast, acutely infected (AI) animals were viremic only at the first sampling, while after 30 days they were expected to become virus negative. Using this strategy, 3 AI and 15 PI animals were detected, which were immediately slaughtered. All calves born from September 2014 to March 2015 were tested for HoBi-like pestivirus within 10-20 days of age, so that additional 7 AI and 16 PI calves were identified and subsequently slaughtered. Soon after the eradication program started, the farm productions increased markedly in terms of milk production, reproductive performance, growth rates, thriftiness, lower occurrence of other diseases, and decreased mortality among

young stock.

In conclusion, HoBi-like pestivirus introduction into the herd has the same outcome as the other, more widespread, pestiviruses, bovine viral diarrhoea virus types 1 and 2, whose impact on animal production is well recognised.

Joseph Dellapenna
Professor, Villanova University, USA

Patterns of Water Law

I will present an overview of global trends in water law through history. I begin with a brief examination of the idea of “law,” and follows with a description of the earliest recorded forms of water law. Water law through the centuries has conformed to a limited set of patterns, in part as a response to the characteristics of the resource and in part because of the migration of water law systems from society to society and continent to continent. The available options can be organized according to the relationship of the use to the resource, according to the nature of a property right recognized by the relevant law, or according to the purpose of the regulation. I summarily trace the evolution and characteristics of national, supranational, and international water law, how they are related, and where they might be headed. I will close by indicating the relative strengths and weaknesses of the available options, both for surface waters and for groundwater, drawing on my work in drafting model water codes for the American Society of Civil Engineers as well as my other legal experiences and scholarship.

M. Claudia Diez

Associate Professor, Universidad Nacional de Colombia Sede Medellin,
Colombia

Flavio Moreno

Associate Professor, Universidad Nacional de Colombia Sede Medellin,
Colombia

&

N. Walter Osorio

Associate Professor, Universidad Nacional de Colombia Sede Medellin,
Colombia

Effect of Fertilizer Application on Flowering and Fruiting of Vanilla (*Vanilla Planifolia* Jacks. Ex Andr.)

The crop of *Vanilla planifolia* Jacks. ex Andr. has received much attention due to its great commercial importance as the only source of natural vanilla, which is extracted from its fruits for the industry of flavours and scents. The nutritional status of plant affects the processes of flowering and fruiting. This study was conducted to determine the effects of fertilizer application on flowering, fruiting, and leaf nutrient content of *Vanilla planifolia*. Treatments consisted of the application of grade 10-20-20 NPK fertilizer to the substratum in annual doses of 20, 50 and 100 g/plant plus a monthly application of foliar fertilizer. Two more treatments were foliar fertilization and a control (no fertilization). Treatments increased the number of inflorescences and flower buds per plant, as well as the number and weight of fruits per plant, and decreased the abortion of flowers and immature fruits. These effects depended on the type of fertilizer, the amount applied, and the time of evaluation. The best results were obtained with the 100 g/plant- year treatment with an annual production of 1,5 kg of fruits per plant in the second year. Unfertilized plants produced 0,55 kg/plant- year. Differences were also found in foliar content of N, P, K, and Cu between vegetative and reproductive branches. Application of fertilizer to the substratum appears to improve reproductive parameters of vanilla plants and the production of beans, while foliar fertilization alone was ineffective in increasing crop productivity. Nutrients also seem to translocate from mature leaves to fruit racemes.

Ajay Dwivedi

Junior Research Fellow, National Environmental Engineering
Research Institute, India

M Suresh Kumar

Sr. Principal Scientist, National Environmental Engineering Research
Institute, India

&

A.N. Vaidya

National Environmental Engineering Research Institute, India

Audit Based Approach for Water Footprint Assessment in a Molasses Based Distillery

Environmental audit is a systematic, documented, periodic and objective review in relation to practices being followed to meet the environmental requirements. The present water audit study covers a broad area ranging from water resources and existing water resource management in the facility. The specific water consumption was estimated considering all the facilities with total production capacity of 42KLD. For a typical water consumption of 1340m³/day (excluding domestic water consumption), the specific water consumption is estimated to be 32litres of water / litre of alcohol produced. The annual water cost incurred by the facility is about Rs. 186 Lakhs. About 18% of the total water uptake is rejected from the pre-treatment units. The soft water generated is mainly used in the process for molasses dilution and for cooling tower make-up. About 443m³/day of soft water is generated. Out of which 266m³/day is taken to cooling tower make-up, and 400m³/day of remaining softwater is supplied for dilution of molasses. Around 349m³/day of soft water is taken to the R.O and the treated R.O water is stored at the RO water tank. About 71% of the raw water is retained as RO permeate. Of this the major part about 209m³/day is sent to DM plant and 113m³/day is consumed for product blending. Chemical Oxygen Demand (COD) removal efficiency of primary Structured Media Attached Treatment reactor (SMAT) was around 80% and that of secondary Upflow Anaerobic Sludge Blanket Reactor (UASB-R) was around 60% as low BOD wastewater as added to it. The study suggested important water conservation measures such as installation of flow meters, reuse of pressure filter and filter plant backwash water, reuse of cooling tower blowdown for floor washing and use of air cooled condenser. Use of multi effect evaporators or additional membrane bioreactor was suggested for achieving zero liquid discharge.

Temesgen Enku

Ph.D. Student, Bahir Dar University, Ethiopia

Assefa M. Melesse

Florida International University, USA

Essayas K. Ayana

Bahir Dar University, Ethiopia

Seifu A. Tilahun

Bahir Dar University, Ethiopia

Gete Zeleke

Water and Land Resource Centre, Ethiopia

&

Tammo S. Steenhius

Cornell University, USA

Watershed Storage Dynamics in the Upper Blue Nile Basin: The Anjeni Experimental Watershed, Ethiopia

Understanding functions of a watershed is important for implementing appropriate soil and water conservation measures and for planning and development of water resources for sustainable use. Watershed storage is a significant part of a catchment water budget and its quantification provides a clue to understand the fundamental catchment hydrological processes. This study is aimed to investigate the dynamics of watershed storage of the The Anjeni (113.4ha) experimental watershed found in the upper Blue Nile basin for which a long series of rainfall and runoff data available is used to provide this investigation. The daily water balance equation was used for quantifying the watershed storage over the distinct rainy seasons. On average, 86% of the annual rainfall occurs during these distinct rainy seasons. The study showed that the watershed storage increases with the increase of cumulative effective rainfall till the watershed stores its maximum capacity. After this maximum capacity, the watershed storage remains constant, even if the rainfall continuous. The Anjeni watershed stores an average of 380 mm of water after a cumulative effective rainfall of 625 mm. Before the maximum storage reached, about 60% of the effective rainfall was occurred to wet up the watershed, where the remainder becomes surface runoff and interflow, during which about 40% of the flow appeared at the outlet.

Bernadett Galya

Ph.D. Student, University of Debrecen, Hungary

Peter Riczu

Research Assistant, University of Debrecen, Hungary

Lajos Blasko

University of Debrecen, Hungary

&

Janos Tamas

Head and Professor, Institute of Water and Environmental
Management and University of Debrecen, Hungary

Risk Assessment of Drought Impacted Areas in Great Plain of Hungary

Drought is a natural phenomenon defined as sustained and extensive occurrence of below average water availability. Drought management depends on indices to detect drought conditions, and thresholds to activate drought responses. Indices and thresholds are important to detect the onset of drought conditions, to monitor and measure drought events, and to quantify the hazard. Drought is a recurrent feature in Hungary's climate and it can cause significant damage to the country's agriculture. Agriculture has always been an important role in economy, food supplies, and sustainability of society and creation of job opportunities in Hungary. Our country has resource-related strength of agriculture, because we have more than 4,5 million ha for agricultural production. Agricultural production can be influenced by several factors, including climate, hydrology, soil conditions and antropogenic impacts. Climate determines the quality and quantity of the crop yields. The climate conditions in Hungary are variable and it shows spatial and temporal extremes. As a result of this, drought have become more frequent in our country (2003, 2007, 2009, 2012,), which is reflected in the decline in yields as well. The NDVI is widely used for monitoring and forecasting crop production world-wide and by agricultural insurance companies.

Our study area was located in Great Plain of Hungary. Due to our natural capabilities and georaphical location, the most severe drought are in there. In the present study, NDVI values were compared with yield values in small plot area. We made this survey in two different soil texture such as heavy and sandy soils. Furthermore the temperature and precipitation data were calculated from data of local meteorological station. Finally meteorological data were compared with NDVI values and yield data. Based on these data, we determined the critical terms in crop production, which is important to reduce the severe impact of drought on yield.

Jae Gon Kim

Research Scientist, Korea Institute of Geoscience and Mineral
Resources, Korea

Chul-Min Chon

&

In-Hyun Nam

Magnetite and Birnessite Composite for Treatment of as (III) Contaminated Water

Contamination of water with As(III) is a high environmental concern due to its high toxicity and mobility. In this study, we synthesized magnetite-birnessite composites by the oxidation of Fe(II) and Mn(II) at alkaline condition and tested the adsorption capacity for As(III) and As(V) from aqueous solution under the composite dose of 0.05 – 0.01 g L⁻¹ and 7 - 2670 µM of As(III) and As(V). The composite showed a high oxidation capacity for As(III) to As(V) rendered from birnessite and a high As(V) adsorption capacity from magnetite. The results of kinetic experiment for the As(III) adsorption revealed that the oxidation of As(III) to As(V) occurred at early stage of the reaction and then the oxidized As(V) was adsorbed on the surface of magnetite. The adsorption capacity of the composite for both As(III) and As(V) increased with increasing the magnetite content of the composite. The composite showed a similar adsorption rate for As(V) at pH 3 – 6 but showed a sharp decrease of adsorption rate with increasing solution pH. The maximum adsorption capacity for As(V) determined with Langmuir equation was 200 mg g⁻¹. The NO₃⁻ in the aqueous solution had no significant effect on the adsorption As(V) by the composite but the PO₄⁻³ had a negative effect. The overall results of this study demonstrated that the composite had a high potential for the treatment of As(III) contaminated water for the high As(III) removal capacity and the magnetic property enabling easy removal of the composite after the adsorption.

Dace Grauda

Associate Professor and Leading Researcher, University of Latvia,
Latvia

Inta Belogradova

Researcher, Institute of Biology, University of Latvia, Latvia

Isaak Rashal

Head of the Laboratory, University of Latvia, Latvia

&

Lada Bumbure

Researcher, Riga Technical University, Latvia

The Influence of Low Frequency Electromagnetic Field on Plant Cells

Both low frequency electromagnetic field and SiO₂ nanoparticles are components of urban environment and as well parts of urban pollutions. Knowledge of the mechanisms, through which the low frequency electromagnetic field and SiO₂ nanoparticles affect cells, is incomplete. The aim of the study was to explore fluorescence changes in the variable electromagnetic field itself, and in combination with cell incubation in SiO₂ nanoparticles suspension. Changes of relative fluorescence intensity of cells after influence of those stress factors were recorded by the BD FACSJazz® flow cytometer (BD Biosciences, USA) in blue laser (488 nm). Preliminary, multiple gate sizes and shapes were tested to find one with the lowest CV. Using flow cytometer BS FACS Software 1.0.0.650 cells plot was created to determine the densest part and later gated using oval-shaped gate which included from 80 to 90% of all cells. The immature pollen cells (one-nucleus stage) of several plant species (*Cyclamen persicum*, *Hordeum vulgare* and *Triticum aestivum*) were involved in the research. A significant increase in relative cell fluorescence was observed for cells of investigated plant species after treatment by all combinations of investigated stress factors.

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Juan Grima

Researcher, Instituto Geológico y Minero de España, Spain

&

Bruno Ballesteros

Head of Valencia Unit, Instituto Geológico y Minero de España, Spain

Characterization of Wetlands and its Relationship to Groundwater in a Semiarid Mediterranean Environment

Currently, from the scientific point of view, there is no universally recognized definition of wetland, although there are strategic definitions, established to develop specific programs, such as the protection of birds. The one developed by the Ramsar Convention is one of the most widely accepted. From the legal point of view, on the other hand, there are countries, such as Spain, where there is a definition of wetland, which in our case coincides substantially with the Ramsar Convention. At European level, the most important piece of legislation regarding water resources management and wetland conservation is the Water Framework Directive. Preventing further deterioration and protect and improve aquatic and terrestrial ecosystems as well as wetlands that depend on them can be listed as key principles. In Royal Decree 907/2007 (Hydrological Planning Regulations), the mandatory inclusion of wetlands of the National Wetlands Inventory in the register of protected areas of the WFD is highlighted. The challenge of managing these wetlands and protected areas involves the development of tools for sustainable use of water resources linked to these ecosystems, some of which are included in the Ramsar list of wetlands. Many of the pressures likely to cause negative impacts in these areas are directly or indirectly related to the management of water resources. Therefore, improving the knowledge of the physical environment is a key issue for management, especially its formation processes and its hydrological conceptual model. Particularly, for several selected wetlands in the Júcar Basin, (along the Mediterranean coast of Spain) geological and geomorphological conditions were analyzed as well as the origin of their resources and related water systems (watershed and associated aquifers). Definition of hydrodynamic functioning of these systems is necessary to quantify the elements of water balance. Hence, tentative water balances of wetlands (where sufficient data exist) have been elaborated. With all these factors, together with the hydrochemical characterization of the water and the spatiotemporal evolution of their physicochemical parameters, the conceptual and operational model of each wetland has been developed, with the ultimate goal of establishing patterns of behaviour and management.

Maysa Hatata

Assistant Professor, Alexandria University, Egypt

Functional and Ultrastructural Changes of the Photosynthetic Apparatus in Leaves of Broad Bean Plants (*Vicia faba* L) in Response to Cd and Zn Interaction

Heavy metal ions as Cd inhibit uptake and transportation of other metal elements such as Mn Zn and Fe by antagonism in leaves of *vicia faba* L. concentrations of Cd or Zn up to 100µM induced a remarkable decrease in chlorophyll content compared to control. The degradation in Ch .b under such stress was slower than that of Ch. a. Also, it was found that Cd had more inhibitory effect on pigments than Zn in broad bean leaves even under low concentration of Cd (50 µM). The results cleared that Zn can strongly antagonism the toxic effect of Cd especially with high Zn concentrations and there was full protection and restoration of the chlorophyll levels. The concentrations of Na, Mg, P, K, Ca, Cu, Al, Mn and Zn bounded to the cell membrane, revealed a significant decrease of Ca, K and Mg in the presence of Cd or Zn, also the disappearance of Fe peak was observed at 100Cd. The disappearance of it under Cd treatment could be due to Cd ions interaction with the manganese cluster which is present in the evolving complex on the donor side of PSII. The effect of metal toxicity, Zn and or Cd, in thus study, caused many damages to the cell organelle ultrastructure. Changes in chloroplast ultrastructure and lipid composition of the thylakoid membranes alter the operability of the photosynthetic electron transport chain. The chloroplast treated with 100 µM Cd has a reduced number of intact grana as well as reduced chloroplast size. Combined treatment of cadmium and zinc led to more changes in the shape of cells, such as, the shape of chloroplasts was almost spherical, the grana were completely damaged and a large part of chloroplast with disturbed envelopes. Increasing Zn over Cd concentration treatment acquired negative effect which can successfully antagonize the harmful effect of Cd.

Svatoslav Hluchy

Professor, Slovak University of Agriculture in Nitra, Slovak
&

Robert Toman

Associate Professor, Slovak University of Agriculture in Nitra, Slovak

Transmission Electron Microscopic Analysis of Smooth Endoplasmic Reticulum of Mammary Secretory Cells in Rabbits during Lactation and Regression Stages

The aim of the research was to describe and analyze changes of smooth endoplasmic reticulum (SER) of mammary epithelial secretory cells in rabbits during lactation and regression stages. Typical short tubules, thinned cisternae and elliptical vesicles without ribosomes were found in the middle and apical parts of cells during lactation stage. The average relative volume of SER reaches 0.439 % of cytoplasm volume. Negative correlations were calculated with the relative volume of granular endoplasmic reticulum (GER), mitochondria and lipid droplets. The relative surface of SER reaches $0.09 \mu\text{m}^2 / \mu\text{m}^3$ of cytoplasm, while negative correlations with relative surface of GER, mitochondria, empty vacuoles, lipid droplets and multivesicular bodies were found. The average size of tubules and vesicles of SER was $0.172 \mu\text{m}$. Negative correlations with average size of mitochondria, secretory vesicles, protein granules, empty vacuoles, lysosomes, lipid droplets and multivesicular bodies were found. Average size of SER positively correlates with average size of Golgi apparatus cisternae. Relative volume of each single SER vesicle reaches $0.022 \mu\text{m}^3$. Presence of tubules and vesicles of SER during regression stage were not found. Our observations using transmission electron microscopy, quantitative and statistical analysis have shown the functional relationship of these structures with synthetic and transport processes in the cell.

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Essam Hoballah

Associate Professor, National Research Centre, Egypt

M. Saber

National Research Centre, Egypt

I. Matter

National Research Centre, Egypt

&

A. Zaghloul

National Research Centre, Egypt

Bioremediation of Polyaromatic Hydrocarbons (PAHs) in a Sewaged Soil by Certain Remediative Amendments followed by Phytoremediation

The key polyaromatic hydrocarbons (PAHs) members in a high contaminated sewage soil ecosystem were bioremediated using various single and/or combined remediative amendments of phosphate dissolving bacteria (*Bacillus megatherium* var. *phosphaticum*), *Thiobacillus ferrooxidans*, *Thiobacillus thiooxidans* and mycorrhizal (AM) conidia followed by phytoremediation with certain hyperaccumulator plants (*Brassica napus*, *Brassica juncea* and *Solanum nigrum*) in two column and field experiments the first irrigated with regular water and the second with treated sewage effluent. Out of eleven investigated polyaromatic hydrocarbons in the high contaminated sewage soil only three polyaromatic hydrocarbons were detected, i.e. phenanthrene, anthracene and chrysene. Results indicated that the three detected polyaromatic hydrocarbons tended to persistently disappear from the soil under the action of both indigenous biomass and root exudates in the presence and absence of the experimented remediative amendments. The highest diminish rate was recorded under the action of indigenous biomass and root exudates in association with *Thiobacillus* strains mixture followed by mycorrhizal AM and the combined mixture of all remediative amendments. After bioremediation phenanthrene, anthracene reached a non-detectable level, while the content of chrysene persisted in the soil ecosystem even after phytoremediation, however, it was reduced to 49 and from 41- 47% of its initial content respectively under regular water or treated sewage effluent irrigation associated with bioremediation with a combined mixture of all remediative amendments followed by phytoremediation.

Bari Hodaj

Lecturer, Agriculture University of Tirana, Albania

Petrit Ramaj

Professor

&

Ardian Doko

Pedagogue, Agriculture University of Tirana, Albania

Phenological Stages and Climatic Adaptation of Hazelnut cv. Visoka

Knowledge of relations of plants - climate affect in the proper management of plants to obtain high and good quality production. The low temperatures (below -10 °c), at the time of flowering is an limiting factor in regionalization of hazelnut in different climatic areas. As it will be shown in the results of this study, the release of pollen from male flowers in variety of Visoka, start at the beginning of January until the second fortnight of February. This depends from climatic zones and the climatic conditions consequently.

For this issue is studied the period of the flowering of the hazelnut in three points (zones) with significant differences of the temperatures in the months, when the hazelnut blooms, in January-February. The change of the average minimum temperatures has significantly influence in the flowering time of hazelnut.

It is found that the alteration of temperatures with - 6.7°C postponed the flowering period 36 days and the change of the -7°C postponed the flowering period by 42 days. That means that hazelnut, cv Visoka avoids the damaging of the flowers from the cold by shifting the time of flowering, when they are grown in cold areas.

Lilliana Hoyos-Carvajal

Professor, Universidad Nacional de Colombia, Colombia

Espinosa, S.

Quiroz, I.

Silva, M.

Maya, M. F.

Mercado, C.

Quiroz, J.A.

&

Santos, A.

Universidad Nacional de Colombia, Colombia

**A Case of Biocontrol of Invasive Plague in Colombian
Seaflower Biosphere Reserve**

Multicatrices fluted scale (MFS), *Crypticerya multicatrices* (Hemiptera: Monophlebidae), infesting various plants in the islands San Andrés, Providencia and Santa Catalina, which has been declared a UNESCO World Biosphere Reserve. MFS it is a polyphagous specie, it has been reported in 95 hosts, and was a serious problem as invasive insect with an incidence near to 98%, with an apparent absence of natural enemies there, and moreover other control practices as chemical use is restricted completely. In San Andrés crops, an assessment of possible enemies allows detect an incipient infections in MFS caused by an enthomopathogenic fungus, identified as *Isaria poprawskii*, which is specie recently described, and parasitic/predator insects as *Anovia* sp., *Cryptognatha auriculata* and *Zagloba beaumonti*. Focused on those bioregulators organisms, were carried out studies in order to control the invasive insect, with minimal impact on the environment of the islands. In case of *I. poprawskii*, greenhouse tests were conducted in on six species of plants (*Cassia fistula*, *Citrus sinensis*, *Pisidium guajaba*, *Tamarindus indica*, *Anona muricata* and *Coccus nucifera*) infested with MFS were sprayed with a aqueous suspension of conidia at 1×10^6 ufc/ml, those were kept in greenhouse (28°C), 7 days posterior to inoculation (dpi), were noticed initial growth of mycelia in insects, reached infection of 69,6 to 100% at fourteen dpi. Then in field, were conducted application with efficiency of 80% of control sprayed in similar dosage. Predator insects were released/favored in field as well, predation capacity and high dispersion of biocontrol insects, succeeded in bringing down the population of the invasive pest, close to 1% levels. Evidencing that basic studies in bioregulator insects pest populations, coupled with the restriction of use of chemical molecules, in this particular case, results in regulation of MFS in term of four years, a successful case of biological control in invasive scale.

Hannah Karuri

Lecturer, Embu University College, Kenya

Ruth Amata

Embu University College, Kenya

Nelson Amugune

Embu University College, Kenya

&

Charles Waturu

Embu University College, Kenya

Nematode Community Response to Bt Cotton in a Kenyan Field Trial

Genetically modified cotton encoding insecticidal proteins from *Bacillus thuringiensis* (Bt) confers protection against the African bollworm. The Bt toxins which are introduced into soil may affect the composition and activity of soil nematodes. The objective of the study was to carry out a pre-release risk assessment to evaluate the impact of Bt toxins on soil nematodes which is a requirement by the National Biosafety Authority of Kenya before commercialization of transgenic crops. The nematode community structure in soil cultivated with Bt cotton (containing Cry1Ac and Cry2Ab2 protein), isoline (non Bt cotton) and HART 89M (non Bt cotton) was evaluated in a field trial at Ndomba in the Central Province of Kenya. The experiment was laid out in a completely randomized block design. Rhizosphere soil was collected from the different treatments for two seasons at 0, 30, 60, 90, 120, 150 and 180 days after planting (DAP). The presence of Bt protein in roots and soil was determined using ELISA and insect bioassays. Nematodes were extracted from soil using centrifugal-floatation method. Nematode numbers were counted and identification to genus level was done under a compound microscope at a magnification of $\times 400$ and $\times 1000$. Cry1Ac was detected at 30DAP in both seasons while Cry2Ab2 was present in roots throughout the growing period in the two seasons. No Cry1Ac or Cry2Ab2 was detected in HART 89M and isoline roots and soil. Bacteria feeding nematodes were present in significantly ($P < 0.05$) higher numbers in the Bt cotton than in isoline plots. Bt cotton plots had lower nematode diversity than isoline in both seasons. Bacteria feeders were also dominant in HART 89M than in isoline treatment in both seasons. Genus richness was not significantly different between the Bt cotton and isoline treatment but there was a significant effect of time ($F = 7.42_{[6, 81]}$; $P < 0.001$) and season ($F = 66.7_{[1, 81]}$; $P < 0.001$). In comparison, genus richness was significantly different ($F = 5.94_{[1, 81]}$; $P = 0.017$) between isoline and HART 89M treatment and there was also a significant effect

of time ($F=4.62_{[6, 81]}$; $P<0.001$) and season ($F=84.0_{[1, 81]}$; $P<0.001$). The dominance of bacteria feeders has not been reported in other similar studies. This is the first study on the impact of Bt cotton on soil nematodes in Kenya. It provides useful baseline data that is required by the National Biosafety Authority before commercialization of Bt cotton in the country.

Armagan Kaya

Assistant Professor, Adiyaman University, Turkey

&

Emel Yigit

Associate Professor, Inonu University, Turkey

Effects of Salicylic Acid and Flurochloridone on the Physiological and Biochemical Parameters in *Vicia Sativa*

Phlorochloridone is a selective herbicide inhibiting the activity of phytoen desaturase enzyme. Phytoen desaturase is related with carotenoid biosynthesis. In this study, the effect of flurochloridone on physiological and biochemical parameters in *Vicia sativa* L. was determined. In addition, the effect of exogenously applied salicylic acid (SA) on flurochloridone-induced toxicity was examined.

In the herbicide-treated plant leaves, the total chlorophyll and carotenoid contents and activities of antioxidant enzymes decreased depending on the increasing concentrations of herbicide in both the SA-pre-treated and non-treated plants. The total chlorophyll and carotenoid contents and ascorbate peroxidase (APX) activity increased in the control and treatment groups that were pre-treated with SA compared to the groups that were not pre-treated with SA. Catalase (CAT) and superoxide dismutase (SOD) activities decreased in SA pre-treated plants. The malondialdehyde (MDA) content increased, regardless of SA treatment, compared to the control groups. Exogenous SA treatment decreased MDA content compared to plants that were not treated with SA. The total phenolic content decreased in the control and treatment groups in the SA pre-treated plants compared to the non-treated plants. The endogenous SA content and residual levels of herbicide increased depending on the increasing concentrations of herbicide. We found that in the treatment groups of SA-pre-treated plants, the residual amount of herbicide was reduced compared to the non-treated plants.

This study has shown that phlorochloridone affects not only carotenoid content in target plant but also other physiological and biochemical parameters and reduces herbicide toxicity of exogeneous SA application. The findings of this study suggest that considering the effects of SA on target plant, the toxicity reducing effect of SA should be used for increasing the herbicide resistance of cultured plants.

Brian Kelleher

Lecturer, Dublin City University, Ireland
Paul Flanagan, Post-doctoral, Dublin City University, Ireland

Kris Hart

Post-doctoral, Dublin City University, Ireland

Chris Allen

Lecturer, Queens University Belfast, U.K.

Andre Simpson

Lecturer, University of Toronto, Canada

Seth Oppenheimer

Lecturer, Mississippi State University, USA

Brian Murphy

Post-doctoral, Dublin City University, Ireland

Shane O'Reilly

Post-doctoral, Dublin City University, Ireland

&

Sean Jordan

Dublin City University, Ireland

How Does the Addition of Sulphur to Soil Influence Chemosynthesis and Carbon Flux?

The sequestration of CO₂ in soil represents a potential solution to rising atmospheric carbon concentrations and lowering agricultural productivity (King, 1010). The microbial contribution to soil organic matter (SOM) has recently been shown to be much larger than previously thought and thus its role in the carbon cycle may also be underestimated (Simpson et al, 2007). Both photoautotrophic and chemoautotrophic soil microorganisms can fix CO₂ through a variety of assimilatory pathways (Yuan et al, 2012). Chemoautotrophs can work without sunlight as an energy source and glean energy through the oxidation of reduced elements such as sulphur. Recently we showed that by adding an electron donor, in this case S₂O₃²⁻ to a soil slurry, there was an order of magnitude increase in the uptake of CO₂ by chemoautotrophs (Hart et al, 2013). What then happens when sulphur is added to soil as is done commonly in agriculture? Here we show that over a 12 week period, the addition of sulphur to soil results in an initial surge in production of CO₂ through microbial respiration/degradation and this is followed by an order of magnitude increase in the sequestration of carbon from the atmosphere as elemental sulphur is oxidised to sulphate. Stable isotope Probing (SIP) shows that *Thiobacillus* spp (a chemoautotrophic bacterium) take advantage of the reduced conditions to become the dominant group that consumes ¹³CO₂ and uses the carbon for cellular growth. Through

nuclear magnetic spectroscopy (NMR) we can discern the direct incorporation of atmospheric carbon, facilitated by the oxidation of sulphur, into soil carbohydrate, protein and aliphatic compounds and differentiate these from existing biomass.

Alfonso Larque-Saavedra

Professor, Scientific Research Center of Yucatan, Mexico

Prehispanic Biotechnology in Mexico

Taking into account the Biotechnology definition that states that is “any technological application using biological systems or their derivatives for the creation or modification of products or processes for specific uses” that was signed in the Biological Diversity Agreement from 1992, it was decided to search for the existence and practice of these kinds of technologies in Mexico were developed prior to the arrival of the Spanish in 1521. We shall present five biotechnologies are presented 1.- nixtamalization of maize, the staple food of the Mexicans 2.- procurement and use of *pigments or dyes* with special attention to grana cochinilla, 3.- The technology to obtain and manage elastic polymers for the elaboration of the balls for the well-known game “juego de pelota” practiced by various Mesoamerican cultures, 4.-the fermentation process to make pulque, chocolate from cacao and the discovered of vanilla, 5.-the empirical use of papain enzyme from *Carica papaya* a local fruit plant used to tenderize meat. In this research work the most critical and limiting factor was that most of the evidences that could have been written in codices were destroyed by the conquerors, although documents written 30 or 50 years after the conquest, help to elucidate the level of knowledge of this discipline.

Ju Young Lee

Senior Researcher, Korea Institute of Science and Technology, South
Korea

Hak Cheol Kwon

Principle Researcher, Korea Institute of Science and Technology, South
Korea

Su-Nam Kim

Principle Researcher, Korea Institute of Science and Technology, South
Korea

Jae Wook Lee

Principle Researcher, Korea Institute of Science and Technology, South
Korea

Jin-Soo Park

Jin Wook Cha

Principle Researcher, Korea Institute of Science and Technology, South
Korea

Min Jung Lee

Senior Researcher, LED-IT Fusion Technology Research Center,
Yeungnam University, South Korea

**Ecological Relationships between Habitat Conditions,
Plant Diversity and Geographic Location on the National
Park, South Korea**

In this paper, the relationships among forest vegetation and the environmental factors were studied from August 2012 to August 2014. The formation of habitat can be caused by non-native plant invasions, climate change or environmental conditions. However, the formation of ecosystem has remained a debated question. We tried to test a hypothesis in the special case of *Quercus mongolica*, *Quercus aliena*, *Carpinus laxiflora*, *Pinus densiflora*, *Staphylea bumalda*, and *Taxus cuspidate* formatting natural habitat. We compared plant communities, soil properties, geological conditions and climatic conditions between plant species and mixed forests. Relationships among them were investigated using statistical analysis. These factors gave the effect of the formation of plant habitat. Especially, the climatic conditions and geographic locations were more important factors through the principle component analysis. We concluded that in formatting and managing forest ecosystems where plant communities are mainly driven by mixture of major two factors and minor factor (soil property).

Yong Hoon Lee

Professor, Chonbuk National University, Korea

&

Dipto Bhattacharyya

Post-doctoral Fellow, Chonbuk National University, Korea

***Proteus Vulgaris* JBLS202 Modulated Phenotypes of *Arabidopsis Thaliana* and its Rhizosphere Microbiome**

Volatile organic compounds (VOCs) produced by bacteria play an important role in plant growth and development. VOCs emitted by the rhizobacterium *Proteus vulgaris* JBLS202 increased the fresh weight of *Arabidopsis thaliana* Col-0. However, exposure to the VOCs did not promote growth in the mutant lines of *A. thaliana* defective in auxin transport (*eir1*), cytokinin (*cre1*), and brassinosteroid metabolism (*cbb1*), whereas growth was significantly increased in the ethylene- (*etr1*) and gibberellin-insensitive (*gai-1*) mutants. The growth promotion of *Arabidopsis* Col-0 treated with auxin, and brassinosteroid biosynthesis inhibitors was inhibited by the VOCs. In addition, exposure of Col-0 seedlings to JBLS202 for 14 days resulted in overexpression of *small auxin up RNA*, *histidine kinase1*, and *brassinosteroid biosynthetic cytochrome P450* genes. Moreover, the abundance of total bacteria and *Pseudomonas* spp. in the JBLS202-treated rhizosphere increased significantly compared to that in the nonbacterized rhizosphere until 23 days after treatment, indicating the modulation of underground microbial abundance by bacterial volatiles. Overall, the results of this study suggest that exposure to volatiles from JBLS202 modulates plant development and the soil microbial community, which influencing microbial functional and metabolic diversity.

Ming Luo

Postdoctoral Fellow, The Chinese University of Hong Kong, Hong
Kong

Multiscaling Behavior in Global Dry/Wet Conditions

Extreme dry and wet conditions hazards exert tremendous impacts on human society in the world and ecosystems across the globe. Characterizing the variability of dry/wet conditions at all relevant temporal and spatial scales is a challenge to the research community. While intense studies have focused on the low-frequency trends and components, only a few approach the problem from the perspective of high-frequency components, e.g., the fluctuation pattern and multiscaling behaviors of the variation of dry/wet conditions. In this study, the scaling and multifractal properties of dry/wet conditions over the globe were explored by using a multifractal detrended fluctuation analysis (MF-DFA) method. Long-term monthly time series of the standardised precipitation evapotranspiration index (SPEI) in different parts of the globe in the 1901-2013 period were analyzed.

Two statistically significant crossover points at 2 and 12.5 years were found in the global SPEI series. The two crossover points are suggested to be linked with the El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO), respectively. On the basis of the two crossover time-scales, the scaling behaviors of SPEI series are separated into three time regimes, namely, small-scale (i.e., < 2 years), medium-scale (i.e., 2.5~12.5 years), and large-scale (> 12.5 years). The global SPEI time series is stationary and exhibits strong long-range correlation and persistence at both small-scale within 2.5 years (i.e., scaling exponent $h=0.86$) and the large-scale longer than 12.5 years ($h=0.74$), implying that a dry (wet) condition in the past is likely to be followed by a dry (wet) fluctuation in future. The time series is, however, nearly non-persistent at the medium-scale of 2.5–12.5 years with $h=0.56$. Meanwhile, the $h(q)$ vs q curves suggest that the dry/wet conditions of the globe are multifractal, implying that the scaling property of dry/wet condition series needs be represented by an array of scaling exponents, rather than by a single one. The scaling exponents at each global grid (0.5×0.5 degree) were also examined to show the geographical dependence of scaling behavior. Analysis results show that the scaling exponents of the dry/wet conditions are heterogeneously distributed over the global lands. Stronger long-range correlations in dry/wet conditions were mainly found over the Equatorial regions (e.g., Northern South America, Northern Africa) and Austria.

This research is of great practical and scientific importance in both global and regional drought studies and hazards mitigation management.

Bao-Luo Ma

Research Scientist, Agriculture and Agri-Food Canada, Canada

Wei Wu

&

Sumei Yao

Sensing Root Electrical Capacitance for Delineating Canola Genotypic Differences in Response to Heat and Drought Stresses

Canola is a crop sensitive to drought and heat stresses that usually occur with different frequency and duration almost every summer during canola flowering in Canada and elsewhere in the world. A controlled growth chamber study was conducted to (i) determine if growth regulator could alleviate heat and drought stress on canola genotypes, and (ii) assess if the measured differences in root electrical capacitance can be used to delineate canola genotypic differences in responses to heat and drought stresses. The study with 4 canola genotypes subjected to heat and drought stress conditions was conducted at the Enhanced Greenhouse and Growth Chamber Facility of the Eastern Cereal and Oilseed Research Centre (ECORC), Agriculture and Agri-Food Canada, Ottawa, ON, Canada. The seeds were sown in plastic pots (11 cm diameter and 9 cm height) filled with field top soils (clay loam) and grown in two growth chambers for two weeks at 23/17°C (day/night) prior to induction of stress treatments. At about 10 d after emergence, plants were sprayed with 30 mg/L 5-Aminolevulinic acid (ALA; 0 mg/L ALA as control) daily for 3 consecutive d. Then plants were subjected to water deficit and high temperature stresses simultaneously. The temperature of one growth chamber was set with the following 24-h cycles: 6:00-10:00 = 23°C, 10:01-11:00=26°C, 11:01-12:00=29°C, 12:01-16:00 =32°C, 16:01-17:00 =29°C, 17:01-18:00=26°C, 18:01-22:00=23°C, 22:01-2:00=26°C, 2:01-5:59=23 °C; and that of the other chamber was maintained at 23/17°C (day/dark) for 10 days. The average temperatures in hot and control chambers were 26/24.5 (~25)°C and 23/17 °C (light/dark), respectively. Two water levels (sub-plot) were applied to the plants in each growth chamber by watering to 85% soil water capacity (i.e., control), and another to 45% soil water capacity (i.e., moderate water stress). At 31 days after sowing (DAS), electrical capacitance (nF) was measured with a BK Precision 879B (B&K Precision Corp., Yorba Linda, CA) at 1 kHz. Biomass of stem, leaf and roots from each pot was determined. Compared to the control, high temperature and drought stresses significantly suppressed root and aboveground biomass, with large

differences in measured parameters among canola genotypes. Application of ALA growth regulator resulted in higher shoot and root biomass than the unsprayed control treatments. Change in root electrical capacitance values reflected the responses of canola genotypes to the stressors. High temperature and drought stress exhibited a significant synergetic/interaction effect on decreasing root biomass and root capacitance. There was a linear relationship between electrical capacitance and root biomass, with larger R^2 values ($P < 0.01$ $n=63$) in stress-tolerant genotypes across high temperature and drought stresses. Our results indicate that measuring electrical capacitance in soil-based pot study is a promising tool to estimate canola root biomass.

Mariem Makhlouf

Ph.D. Student, National Agronomic Institute of Tunis, Tunisia

Ali Chebil

Researcher, The International Center for Agriculture Research in the
Dry Areas, Tunisia

Aymen Frija

Researcher, The International Center for Agriculture Research in the
Dry Areas, Jordan

Talel Stanbouli

Teacher-Researcher, Higher School of Agriculture Mograne, Tunisia

Asma Souissi

Ph.D. Student, Higher School of Agriculture Mograne, Tunisia
&

Abdallah Benalaya

Professor, Higher School of Agriculture Mograne, Tunisia

Quantification of Virtual Water Flows Embedded in the Exchanged Agricultural Commodities of Tunisia

In order to strengthen its agricultural trade balance, Tunisia has been trying to integrate the global agricultural markets via several trade agreements mainly with neighboring countries from the Mediterranean region. However, virtual water flows are highly related to these agricultural trade exchanges. Therefore, nations export water in virtual form through export of agricultural goods which may have significant impact on the future of this resource, especially if the country specializes in the exporting highly water consuming commodities. In this study, we quantify the virtual water flows of Tunisia embedded in the exchange of strategic agricultural products. Our results show that the amount of virtual water exchanged is different for each crop. We surprisingly note that olive oil is classified as the most demanding water product ($7\text{m}^3 / \text{kg}$). By exporting 145,9 thousand tons of olive oil and 97,8 thousand tons of date in 2013, Tunisia has lost respectively 1079,6 Million cubic meters and 283,62 Million m^3 of virtual water. On the other hand, by importing 2146, 6 thousand tons of cereals and 15, 7 thousand tons of potato, Tunisia saved respectively 2901, 7 Million cubic meters and 3.14 Million cubic meters of water resources. This paper also discusses the policy implications of these results in terms of potential future guidelines for national agricultural trade.

Ronald Mandumbu

Lecturer, Bindura University of Science Education, Zimbabwe

C.S. Mutengwa

Lecturer, University of Fort Hare, South Africa

S. Mabasa

Lecturer, University of Zimbabwe, Zimbabwe

&

E. Mwenje

Professor, University of Science Education, Zimbabwe

Tolerance Parameters of *Sorghum Bicolor* L and *Sorghum Arundinaceum* to *Striga Asiatica* under Mulch

Witchweeds, specifically *Striga asiatica*, a hemi-parasitic weed, greatly reduces the grain yields of maize, sorghum and pearl millet grown in the semi-arid environments of sub Saharan Africa, thus threatening food security. In an attempt to find a solution to this problem, a study was conducted to determine the growth response of nine local sorghum cultivars (*Sorghum bicolor*) and one wild sorghum race (*Sorghum arundinaceum*), when grown under pot conditions either in the presence or absence of the following two factors; *Striga asiatica* and maize mulch. The experiment had three factors arranged in a completely randomized design replicated three times. The sorghum varieties Mukadziusaende, Isifumbate and Chiredhi supported the lowest *Striga* counts, whereas the varieties Hlubi, Ruzangwaya and Mashava had the highest incidence of *Striga*. Furthermore the final heights of Mukadziusaende and Chiredhi were not significantly different ($p > 0.05$) in the *Striga* infected and uninfected pots, suggesting that these two varieties resisted the dwarfing effects of *Striga*. In general, Mukadziusaende outperformed the rest of the varieties in tillering and ability to yield in the presence of the parasite. Irrespective of cultivars, mulching increased *Striga asiatica* incidence compared to unmulched pots. This therefore means that mulching with maize mulch exacerbates the *Striga* problem. Therefore it can be concluded that genotypic diversity exists for *Striga* tolerance with the ability to tiller when the main stem is senescing and ability to resist the dwarfing effects of the parasite being the major mechanisms of tolerance. The variety, Mukadziusaende was the best in performance in the presence of *Striga*. *Sorghum arundinaceum* was found to be highly susceptible to *Striga asiatica* therefore it perpetuates *Striga asiatica* and can not be a source of tolerant on the studied traits as they were surpassed by the cultivated *Sorghum bicolor* varieties.

Juan Martinez-Solis

Professor and Researcher, Chapingo Autonomous University, Mexico

Margarita Gisela Pena-Ortega

Professor and Researcher, Chapingo Autonomous University, Mexico
&

Juan Enrique Rodriguez Perez

Researcher, Chapingo Autonomous University, Mexico

Impact of Fruit and Seed Maturity Stages on Germinability

Seed growers harvest their crops when they had reached commercial maturity, stage that does not necessary guarantee good seed quality; therefore, the appropriate harvest time for optimal seed quality has to be determinated for each particular crop. Physiological seed maturity is defined as the stage at which maximum dry matter accumulation is reached, and it has been associated to high physiological seed quality. Several parameters had been proposed to identify this crop stage. In experiments conducted at Chapingo Autonomous University it has been defined that the best seed quality for tomato is obtained when pink and red fruits are harvested, while for husk tomato, high seed germination is obtained when seeds are extracted from yellow fruits. In 'Bayomecentral' bean variety, high seed germination is achieved from seed with 47 % moisture content. For 'Early perfection' pea variety, seed germination above 84 % was observed when fruits were harvested 35 days after flowering; however, high seed vigour was registered when fruits were harvested 35 days later. Maize single cross hybrid 'H-28' showed seed germination above 50 % when seeds were harvested 42 days after flowering, and the highest germination and plantlet vigour were observed when harvest was delayed until 56 to 63 days after flowering.

Assia Meziani

Assistant Professor, University of El-Oued, Algeria

Boualam Remini

University of El-Oued, Algeria

&

Djamel Boutaotaou

University of El-Oued, Algeria

Evaporation of Dam Lakes in Arid Region – Algeria

In arid region, water is a renewable energy at the same time a rare source and poorly distributed. The current situation of water resources and their uses in the south of Algeria have socio-economic issues.

The sudden increase in requirements, delays in the mobilization and transfer programs. The absence of planning and management tools generated chronic deficit situations and impacted negatively on the socio-economic development of our country (Rouissat, 2007).

The phenomenon of evaporation in dam lakes is considerable. A Loss of high volume is annually recorded (Remini, 2002). The five dams located in the arid region (south of Algeria) are: Foug El-Gherza (Biskra), Fontaine des Gazelles (Biskra), Foug El-Guies (Khenchela), Djorf -Torba(Bechar) and Brezina (El-Beidh).

Our paper shows the effects and consequences of evaporation in these five dam lakes on the water supplies that presents a paramount importance in Algeria.

Masarrat Mohamed Abdel Aziz Migahid

Professor, Alexandria University, Egypt

Amal Mohamed Fakhry

Assistant Professor, Alexandria University, Egypt

&

Azhar El-nouby Ahmad

Assistant Lecturer, Alexandria University, Egypt

Herbicidal Activity of *Asphodelus Microcarpus* against Selected Weed Species (*Chenopodium Album*) of Wheat (*Triticum Aestivum*)

The current worldwide demand for cheaper and more environmental-friendly weed management technologies have motivated a considerable number of studies on the allelopathic potential of some plant species as a resource for weed control in crops. The main objective of the present study was to evaluate the bio-herbicidal potential of *Asphodelus microcarpus* L. (AM) on *Chenopodium album* L. (CA); a major pest of wheat (*Triticum aestivum* L., TA). This research was conducted to study the allelopathic effects of AM crude powder on some growth parameters (fresh weight, dry weight & length of shoots and roots) and photosynthetic pigments of the selected weed species; CA and the crop species; TA in both mono and mixed cultures. Moreover, some chemical constituents (soluble protein, free proline and soluble amino acids) were determined in TA.

The results showed a significant reduction in plant growth parameters in both CA and TA, with considerably stronger allelopathic effects on the growth of CA as compared with TA in presence of different concentrations of AM. Photosynthetic pigments in CA were also significantly decreased. The organs length of CA under control was lower in mixed than monoculture. This may be an indication of the allelopathic potential of TA on CA. The results also indicated that, proline and amino acids in TA were accumulated with significant level under the allelopathic effect of AM.

In this respect, TA plants have more tolerance and resistance to the different allelopathic treatment when compared with CA especially in monoculture. The study suggested the suppressive potential of allelopathic plant against selected weed species, and offered promises for their usefulness as a tool for weed management.

Gabriel Minea

Researcher, National Institute of Hydrology and Water Management,
Romania

Hydrological Effect of Land Use at Plot Scale

The aim of this paper is to determine the impact of land use practices on the water resources at plot scale (micro-scale). The study of land use corroborates with rainfall infiltration into soil plays a fundamental role in the water balance. These field experiments were conducted at Aldeni Experimental Basin (45°19'30" N and 26°44'43" E, 238 m a.s.l.), within the experimental network of National Institute of Hydrology and Water Management from Romania. The runoff plots (80 sq. m) have different land covers: one is "grassland" formed mostly of graminoids and another has "bare soil".

This work was based on natural and simulated rainfall. Rainfall and overland flow parameters were measured and recorded during the warm semester (April to September) of 2014. Hydrometrical devices used were based on sensors technic and wave radio: rain gauge data logger (HOBO, RG3-M), water level data logger (HOBO, U20L-04); soil moisture content sensor (model EC-5, ECH2O, Decagon Devices). Artificial rains are generated with the portable rainfall simulator with nozzles. This tool generates artificial rains with a controlled depth, intensity and duration. On the experimental "grassland" plots, were tested rainfall with different duration (10, 15 and 30 minutes), the depths "hp" (10, 15, 60 mm) and intensities (0.5 mm/min, 1 mm/min and 2 mm/min) under different soil moisture content (e.g.: $\theta \sim 0,330 \text{ m}^3/\text{m}^3$ and $\theta < 0,400 \text{ m}^3/\text{m}^3$).

Results obtained for two runoff plots ("grassland" vs "bare soil"), denote significant differences of overland flow parameters (time, discharges, volumes and depths "hs"), runoff coefficients (α), and soil moisture content (θ).

Hydrological impact of land use, emphasized through various correlations (e.g.: θ and α ; hp-hs), distinguish both the role of antecedent soil moisture content (e.g.: a saturated soil is generally $0.400\text{-}0.600 \text{ m}^3/\text{m}^3$), infiltration, and the rainfall characteristics. For example, a rainfall (hp=30 mm) with intensity 1 mm min⁻¹ (30 min), in case "bare soil" plots, result of simulations of revealed that the maximum discharge recorded was 1,09 l/s ($\theta = 0.150 \text{ m}^3/\text{m}^3$; $\alpha = 0.11$), and in the case "grassland" was 2,46 l/s ($\theta = 0.420 \text{ m}^3/\text{m}^3$; $\alpha = 0.32$).

Christopher J. Moon

Senior Lecturer and Ecopreneur, Middlesex University, U.K.

&

Joseph Gebbels

Independent Agricultural Advisor, U.K

The Role of Universities in the Provision of Corporate Social Responsibility and Ethics Teaching in the Agricultural Sector

Recent events have seen an increased focus on the role of business schools in the provision of corporate social responsibility (hereinafter CSR) and ethics teaching (Cornelius, Wallace, & Tassabehji, 2007). There has been comparatively little analysis of CSR and ethics teaching provision in other sectors.

The subject is of considerable interest to businesses as research has shown that the CSR and ethics which a company displays affects its financial performance (Zairi & Peters 2002; Fombrun & Shanley, 1990). The public increasingly sees businesses as the cause of environmental degradation, (Porter & Kramer, 2011) consumers have as a result become increasingly eco-aware and ethically conscious with regard to their purchasing habits (Wilson, 200).

Few industries have as direct a link between economics and the environment as the agricultural industry (Diebel, 2008) and as such this paper analyses the CSR and ethics teaching in agricultural schools in four English speaking countries.

The four countries have distinct policy and cultural differences with regards to areas such as environmental protection, animal welfare and the use of biotechnology.

The study analyses the differences between agricultural schools by means of a content analysis of syllabuses for institutions in each of the countries.

The analysis finds significant differences in the provision of CSR and ethics teaching as a result of geographical location of the institution although interestingly the analysis failed to yield expected difference in CSR and ethics teaching provision as a result of institutional ranking.

Among the most interesting areas for future research as suggested by this review is the analysis of the antecedents of the public's ethical standing with regard to the agricultural industry.

Sangho Moon

Professor, Konkuk University, South Korea

Nayeon Kim

Sungjin Kim

&

Seyeoung Jang

Konkuk University, South Korea

Effects of Growth Stage and Season on the Behavioural Characteristics in Hanwoo (*Bos taurus coreanae*) Steer

Hanwoo (*Bos taurus coreanae*) is main breed for beef production in Korean which has stark changes in seasonal climate, hot temperature and high humidity in summer and cold temperature and low humidity in winter. They are fed under long term fattening system for older than 30 months to produce high quality meat. The purpose of this study is to collect fundamental information of maintenance and social behaviors and find out behavioral characteristics according to growth stage and season in Hanwoo steer. Twenty-seven steers were divided into three groups according to growth stage, growing (GS/6~12month), early-fattening (EFS/13~24month) and late-fattening stages (LFS/25~32month), for field trials.

Maintenance and social behaviors of steer were recorded by camcorder during thirteen hours in daytime for each season. The behaviors were calculated by time (minute, second) and frequency (count) by continuous sampling method and were comparatively analyzed according to growth stages and seasons. Eating time of the GS and EFS was more spendable ($P<0.05$) in spring and autumn than in summer and winter. Eating time of GS was significantly longer ($P<0.05$) than other stages in spring, autumn and winter. Rumination time of LFS was significantly lower ($P<0.05$) than GS and EFS through all seasons. Steers of GS and EFS spent the longest time ($P<0.05$) on standing resting in summer. Time spent on lyingdown resting was the longest ($P<0.05$) in winter of GS, spring of EFS, and spring and winter of LFS. Steers of GS and EFS walked more time in summer than any other seasons ($P<0.05$). The walking time of GS was longer than other stages in spring. Steers of GS and LFS drank more time ($P<0.05$) in summer than other seasons. In self-grooming time, including rubbing and licking a self-body, winter was the highest ($P<0.05$) among four seasons in all growth stages. Social-grooming time of EFS and LFS was the highest in spring while that was the lowest ($P<0.05$) in autumn. In spring and winter, social-grooming of EFS was higher than any other stages while that was lower ($P<0.05$) in LFS than GS and EFS ($P<0.05$). Steers of GS and EFS were more sniffed in spring than in other seasons,

and those of LFS were more sniffed ($P<0.05$) in spring and winter than in summer and autumn. Since steers changed more frequently their behavioral patterns at the time of hot weather and the stage of growing, it is thought that there will be needed to take more careful management in these periods.

Gaetan Moreau

Associate Professor, Universite de Moncton, Canada

Charles Comeau

Aquaculture and Fisheries New Brunswick, Canada

Finbarr Horgan

International Rice Research Institute, Philippines

Jean-Philippe Michaud

Royal Canadian Mounted Police, Canada

&

Jean-Pierre Prive

Plant Medic Inc., Canada

Effects of Perturbations on Ecological Services Provided by Heterotrophic Insects in Temperate and Tropical Agroecosystems

Agroecosystems host and are visited by beneficial species that render essential ecological services such as pollination, pest control, and decomposition of plant and animal organic material. For example, heterotrophic insects involved in the breakdown of fruits, leaf litter, stems, roots, feces and carcasses, can be abundant and form very diverse communities in arable and pasturable lands. It is generally suspected that agricultural intensification negatively affects heterotrophic organisms but few studies have examined whether ecological services were really impacted. In a series of studies, we have examined how attributes of temperate and tropical agroecosystems (e.g., water depth in paddy fields, use of groundcovers and rainshelters with small fruit crops, forest edges bordering pasturable land) have affected communities of heterotrophic insects and the ecological services they provide (i.e., predation and decomposition). Results indicate that the richness and composition of heterotrophic insect communities were affected by the different alterations of agroecosystems, even if the abundance and quality of the organic material used by insects remained unchanged. The magnitude of alteration effects on heterotrophic communities was correlated with alteration intensity. However, shifts in heterotrophic insect communities had variable impacts on ecological services rendered by heterotrophic insects, sometimes improving, and sometimes reducing them. The type of impact was partly explained by the relative role of the species affected by agroecosystem alterations in the dynamics of heterotrophic communities. Because some of the alterations that had a positive effect on ecological services also had little or positive effects on crop productivity, our work suggests that evaluations of the costs and

benefits of agricultural practices should consider the effects of these practices on ecological services.

Flavio Moreno

Associate Professor, Universidad Nacional de Colombia Sede
Medellinm, Colombia

M. Claudia Diez

Associate Professor, Universidad Nacional de Colombia Sede
Medellinm, Colombia

&

Edison Gantiva

M.Sc. Student, Universidad Nacional de Colombia Sede Medellinm,
Colombia

**Effects of Light Intensity on the Morphology and CAM
Photosynthesis of *Vanilla Planifolia* Andr**

Vanilla planifolia Jacks. ex Andr. fruits produce the natural vanilla, an important ingredient for the food and cosmetic industry. It is grown in many tropical countries and recently its cultivation has started in Colombia. The development of this species requires shade and because of that it is planted in association with trees. We evaluated the effect of a gradient of light intensities on CAM metabolism, early growth, and the strategies of acclimation to extreme light environments of this plant by 24-h curves of CO₂ exchange, titratable acidity, and chlorophyll fluorescence, as well as leaf pigment content, biomass, and morphological variables. For this, vanilla seedlings were subjected to four treatments of relative illumination (RI) (8%, 17%, 31% and 67%). Most CO₂ assimilation occurred overnight in all treatments (81.2% of daily total on average). The amount of CO₂ fixed for 24-h was lower in the 67% RI treatment (23.5 mmol m⁻²), equalling almost half of photosynthesis in the treatments of 17 and 31% (53.6 and 50.1 mmol m⁻², respectively), which coincides with the lowest nocturnal acid accumulation in this treatment. Vanilla plants reached greater length, leaf area, and total biomass when grown on intermediate ranges of radiation (17 and 31% RI). The photochemical efficiency of photosystem II (Fv/Fm) shows that in plants of the 67% RI treatment occurred high radiation stress. The highest values of chlorophyll a, b, and total, and the ratio chlorophyll/carotenoid were obtained in plants grown in the shade. These results suggest that the high radiation of the 67% RI treatment alters the functioning of vanilla plants, inhibiting their growth and photosynthesis. The highly shaded environments did not significantly affect the CAM photosynthesis of vanilla, but in the long term this species showed greater biomass gain and better acclimation under intermediate levels of radiation.

Ayman Mostafa

Faculty Member, University of Arizona, USA

Reestablishing IPM Recommendations for Key Insect Pests of Alfalfa Hay in the Low Desert of Southwestern the U.S.

Non-dormant alfalfa hay varieties grown in Southwest U.S. are uniquely adapted to the low desert climates of the region. Unlike many other production regions in the US, low desert alfalfa is irrigated and produces average 7-8 cuts a year, with over 2.5 folds the national yield average. Alfalfa acreage in the region is likely to increase given the importance of the dairy industry and other livestock enterprises and a reduction in cotton acreage due to low cotton prices.

Alfalfa has many environmental benefits: it is a rich habitat for wildlife, provides an insectary for diverse beneficial insects, improves soil characteristics, fixes atmospheric N₂, traps sediments and takes up nitrate pollutants, mitigates water and air pollution, and provides aesthetically pleasing open spaces. Alfalfa fields are important contributors to the biodiversity of agricultural systems; they function as insectaries for beneficial insects, many of which are pollinators or natural enemies that play important roles in the low desert agroecosystem. Beneficial insects move from alfalfa fields into other crops, where they play crucial roles in pollination and biological control. Broad-spectrum insecticide use in alfalfa devastates beneficial insect populations, which affects biological control and pollination across the entire agricultural landscape. Egyptian alfalfa weevil (EAW) is the most damaging arthropod to low desert alfalfa. The threshold for EAW in the western region (20 larvae per sweep) was developed in California in the 1970's (Koehler and Rosenthal 1975). The information supporting the EAW threshold is outdated and not corroborated nor trusted by agricultural professionals who make pest management decisions in the field. Based on 2011-2012 surveys and frequent personal communication with Pest Control Advisors (PCAs) in the region, most use this threshold as a loose recommendation, at best, due to lack of confidence in the basic economic assumptions of the threshold. Broad-spectrum insecticides such as organophosphates and pyrethroids are frequently and increasingly used to control aphids (cowpea aphid, pea aphid, blue alfalfa aphid, and spotted alfalfa aphid), another key pest complex of alfalfa. These, high-risk insecticides are destructive to natural enemy populations, pose risk to applicator health, and have many environmental concerns such as contamination of waterways. Lower risk, selective, environmentally friendly insecticides are available for sucking insects such as aphids in

other crops, but their efficacy against alfalfa aphid complex needs to be investigated. Some PCAs and growers have reported lower efficacy of insecticides that previously provided excellent control. This research has two objectives; 1) to reestablish the economic threshold for EAW to better manage this pest and increase profitability, and 2) to investigate the threshold for blue aphids in alfalfa and study the efficacy of selective vs. broad-spectrum insecticides for the management of alfalfa aphids

Ekaterina Nadezhkina

Ph.D. Student, Russian State Agrarian Correspondence University,
Russia

Elena Nadezhkina

Professor, National Research University, Russia
&

Valeria Vikhreva

Professor, Penza State Agricultural Academy, Russia

The Influence of Selenium on Winter Wheat Resistance to Herbicide Activity

About half of the agricultural products in the world are produced with the usage of herbicides, because it provides large population with effective increase in production and relatively cheap output. However, the cultivated crops are experiencing the pesticide pressure.

In the field experiment on the black soils in the continental climate zone, it was found that herbicide treatment of winter wheat seedlings in the tillering stage by Dialen Super(344 grams per liter 2,4 D acid + 120 grams per liter dicamba acid) at a 0,7 dose liter per hectare causes the plant stress.

One of the main indexes that characterize the level of damaging effects of the negative factors is the intensity of lipid peroxidation. An indirect indicator of the changes in lipid peroxidation is the content of TBA-reactive substances (TBARS). During the herbicide treatment the content of TBARS increased by 34%, comparing to the control samples (perfusion of crops with water).

In the wheat leaves, treated by the following mixture: herbicide + Na₂SeO₄ in concentrations 10⁻⁴ and 10⁻⁵%, after 24 hours the content of TBARS decreased by 39,5-42,2% comparing to herbicide. The decrease in concentration of the products of lipid peroxidation of biological membranes in leaves under the influence of selenium, even in normal conditions is a reliable evidence that selenium either reduces the amount of initiators of the peroxide oxidation, or increases the reliability of biological membranes against oxidative degradation.

The most interesting case of selenium effect on the antioxidant enzymes activity was shown in case of glutathione reductase (GR). Stress load caused an increase in activity of GR by 20.4 % comparing to control samples.

Effect of selenium on the tested plants in stress-free conditions was an increase in activity of the GR by 38-22 %, and under stress conditions by 48 %, regardless of sodium selenate solution's concentration.

The results received leave no doubt in the ability of low doses of selenium (10⁻⁴ and 10⁻⁵%), positively affect the antioxidant status of

winter wheat under the herbicidal stress. Perhaps, this is one of the indicators of the selenium's anti-stress and growth-promoting activity, which was shown in the increase of grain yield by 0.35 tonn per hectare, in case of joint application of selenium with herbicide comparing to the control samples, and by 0,17 tonn per hectare in comparison to herbicide solely.

Shlomo Nir

Professor Emeritus, The Hebrew University of Jerusalem, Israel

Nadya Rakovitsky

The Hebrew University of Jerusalem, Israel

Ilya Brook

The Hebrew University of Jerusalem, Israel

&

Jaap Van Rijn

The Hebrew University of Jerusalem, Israel

Purification of Greywater by a Moving Bed Reactor Followed by a Filter Including a Granulated Micelle-Clay Composite

Shortage of water has resulted in attempts to purify contaminated water. Effective treatment of grey water prior to reuse is important to prevent potential transmission of pathogenic organisms and their propagation. Removal of pathogenic bacteria and reduction of turbidity, TSS and COD from treated grey water (GW) is demonstrated. Three new elements are presented in the current treatment of GW. 1. A granulated complex of micelles of the organic cation ODTMA (octadecyltrimethylammonium) with montmorillonite was employed in filtration of GW. The efficiency of the complex in purifying GW is due to its large surface area, positive charge and existence of large hydrophobic domains. Granulation enables flow without a need to mix the complex with sand. 2. A two- stage treatment of GW was developed, where in the first stage a moving bed reactor was designed to decompose a fraction of the organic matter in the water, thus enhancing the capacity of the micelle-clay filter to remove pathogenic bacteria. 3. Regeneration of the micelle-clay filter was accomplished by passing a dilute solution of Na-hypochlorite. Incubation of GW for two weeks or 1d in the reactor yielded 10 - or 7-fold enhancement in the volume filtered, which included no fecal coliforms per 100 mL, i.e., 300 (or 210) L for 40 g of complex. The capacity per gram of the complex further increased several fold for a filter filled exclusively with granules.

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Valentina Obradovic

Lecturer, Polytechnic in Pozega, Croatia

Josip Mesic

Lecturer, Polytechnic in Pozega, Croatia

Brankica Svitlica

Lecturer, Polytechnic in Pozega, Croatia

&

Maja Ergovic Ravacic

Lecturer, Polytechnic in Pozega, Croatia

Influence of Mycorrhiza and Different Yeast Strains on Physical, Chemical and Organoleptic Properties of Graševina (*Vitis Vinifera* L.) Wine

The object of mycorrhizal association between vine and fungus is to increase absorption of water and/or nutrients from the soil. The aim of this research was to investigate the influence of mycorrhiza to the final product-wine. Besides, for fermentation process authentic yeasts and four different commercial strains of yeasts were used. Grapes were grown in the wine growing region of Kutjevo, Croatia, in 2013. Typical variety for this region is *Graševina*. Obtained samples of wines were tested for alcohol, total acids, total polyphenol content (Folin-ciocalteu method), antioxidant activity (ABTS and DPPH method) and color hue. Sensory evaluation was done by professional tasters. Results showed that usage of different starter cultures of yeasts had different influence on wines depending on the mycorrhiza. Samples with mycorrhiza had good extraction of polyphenols with usage of authentic yeasts, while without micorrhiza starter cultures showed better results, which was evident in the physical and sensory properties as well.

Wa`d Odeh

Master Student, Ben-Gurion University of the Negev, Israel

Shai Arnon

Lecturer, Ben-Gurion University of the Negev, Israel

Alon Tal

Associate Professor, Ben-Gurion University of the Negev, Israel

Alfred Abd Rabbo

Chairman of Chemistry Department, Bethlehem University, Palestine
&

Nader Al Khatib

Director, Water & Environmental Development, Organization
(WEDO), Bethlehem University, Palestine

Occurrence and Fate of EDCs in Wastewater and Aquatic Environments in the West Bank of Palestine

The presence of endocrine disrupting compounds (EDCs) in raw sewage and effluents from wastewater treatment plants (WWTPs) has been increasingly studied in the last few decades. Higher risks are said to characterize situations where raw sewage streams are found to be flowing, or where partial and inadequate wastewater treatment exists. Such conditions are prevalent in the West Bank area of Palestine. To our knowledge, no previous data concerning the occurrence and fate of EDCs in the aquatic environment has ever been systematically evaluated in the region. Hence, the main objective of this study was to identify the occurrence and concentrations of major EDCs in raw sewage, wastewater effluents produced by treatment plants and in the receiving environments, including streams and groundwater in the West Bank, Palestine. Water samples were collected and analyzed for four times during the years of 2013 and 2014. Two large-scale conventional activated sludge WWTPs, two wastewater watercourses, one naturally perennial stream, and five groundwater locations close to wastewater sources were sampled and analyzed by GC/MS following EPA methods (525.2). Five EDCs (estriol, estrone, testosterone, bisphenol A, and octylphenol) were detected in trace concentrations (ng/l) in wastewater streams and at inputs to WWTPs. WWTPs were not able to achieve complete removal of all EDCs, and EDCs were still found in the effluents. In this regard, the most significant environmental estrogenic impact was due to estrone concentrations. Nevertheless, no EDCs were detected in groundwater. Yet, in order for effluents to be reused, significant improvement in treatment infrastructure should be a top priority for environmental managers in the region.

Gyula Oros

Senior Researcher, Plant Protection Institute HAS, Hungary

Zoltan Naar

Ester R. Eszeki

&

Donat Magyar

The Experience of Development of Fungicidal Preparations Based on *Trichoderma* Species

The experience of development of new, *Trichoderma* based emusifyable biofungicide for controlling foliar diseases was summarized. The antifungal properties of toxic substances released by 32 *Trichoderma* strains varied within large limits and strain dependent manner. The susceptibility of target species varied also within large limit, being the *Pythium irregulare* the most, while *Phytophthora infestans* and *Macrophomina phaseolina* the less tolerant ones among 13 phytopathogenic fungi tested. The spectrum of both hosts and antagonists proved to be unpredictable.

In liquid paraffine (LP) of pharmaceutical quality (LP PQ) conidia of various *Trichoderma* strains survived over 2 years. However, in commercial LP the shelf life of them significantly decreased in strain dependent manner, and the presence of emulsifiers selectively reduced the survival rate. The LP PQ was not phytotoxic in therapeutic doses, but commercial LP proved to be toxic when applied as leaf spray independently on the emulsifiers. Both fungitoxic and phytotoxic contaminants of commercial LP could be eliminated with activated carbon.

The application of optimized liquid preparation containing phylloplane originated *T. harzianum* and *T. parceramosum* strains lessened the yield loss to economically acceptable level with significant increase of the quality of product. The amount of liquid formule to be applied as leaf spray could have been reduced in two order of magnitud as compared to the solid preparations to achieve the same effect against late blight of pepper and black spot of roses.

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Ferenc Pal-Fam

Associate Professor, Kaposvar University, Hungary

Richard Hoffmann

Lecturer

&

Sandor Keszthelyi

Associate Professor, Kaposvar University, Hungary

The Effect of Diatomaceous Earth on Tomato Yield in Horticultural Cultivation

Present work deals with the examination of the effect of diatomaceous earth mixed in soil on the quality and quantity of tomato yield under horticultural circumstances in flower pots. The aim was to determine whether the diatomaceous earth has influence on germination, germ development, time and period of yield maturity, as well as on yield quantity. Beside we wondered about the effect of the diatomaceous earth concentration (100 and 150 g kg⁻¹) on the same parameters. On the basis of our investigation it can be said, that the results didn't managed to confirm the differentiation of germination ability. However the heights of the germs were significantly higher in the treatments than in the control. The yield maturity period was shorter in the treatments, being more favourable for horticultural producers. Eventually the main result was the purposeful higher yield mass in the treatments. The 150 g kg⁻¹ dose proved to be more efficacy than the 100 g kg⁻¹. We have drawn on the conclusion that the utilisation of diatomaceous earth in tomato cultivation shows more economic and cultivation advantage effects.

Dariusz Panka

Assistant Professor, UTP University of Science and Technology in
Bydgoszcz, Poland

Malgorzata Jeske

Assistant Professor

Dariusz Piesik

Associate Professor

Katarzyna Koczwar

Doctorate Student

Natalia Musial

Doctorate Student

Marcin Juda

Doctorate Student

&

Karol Lisiecki

Doctorate Student, UTP University of Science and Technology in
Bydgoszcz, Poland

**Effect of *Neotyphodium* Endophyte on Defense Reaction of
Perennial Ryegrass (*Lolium Perenne* L.) under Infection by
Pathogenic Fungi**

Endophytic fungi form very often symbiotic associations with grasses. Endophyte presence can increase resistance of the host plant to abiotic and biotic stresses, e.g. pathogens. Such effect can be associated with diverse range of toxic metabolites produced under the influence of the endophytic fungus. Apart from antibiosis, the other mechanisms are involved in higher resistance of the ryegrass/*Neotyphodium* association to diseases. Endophyte likely induce specific defense mechanisms on the biochemical and physiological level in the host plant. Some role in plants response to pathogens may be associated with production of phenolic compounds, specific enzymes, e.g. chitinases, glucanases, peroxidases, catalases, and emission of volatile organic compounds (VOCs). In fact, there is still little known about all of these mechanisms. Thus, the detailed study was conducted to examine the influence of *Neotyphodium lolii* endophyte on perennial ryegrass, one of the most important grass species in Europe and all over the world. Series of laboratory and pot experiments were conducted to research the total production of phenolic compounds and Patogenesis Related Proteins (PR Proteins) and emission of Volatile Organic Compounds by perennial ryegrass genotypes infected with pathogenic fungi. The competitive activity of *N. lolii* towards pathogen inside the host plant and signaling between the plants through the VOCs were also

researched. Plants infected (E+) and non-infected (E-) by the *N. lolii* endophyte were used. The plants were artificially inoculated with *F. poae* and *R. solani* infection material by foliar spray. Highly significant effect of the perennial ryegrass genotype, endophyte status, time of the analysis after inoculation (DAI) and their interactions on phenolics content, PR proteins production, VOCs emission and signaling in the plants were observed.

Competitiveness between the mycelium of the endophyte and the pathogen inside the perennial ryegrass cannot be considered as the mechanism of higher resistance of E+ plants to infection by pathogens. Endophyte increases the total content of phenolic compounds in perennial ryegrass plants. Content of PR proteins may vary depending on the enzyme and association. *Neotyphodium lolii* increases the emission of volatile organic compounds in perennial ryegrass before and after inoculation by *F. poae* and *R. solani*. Endophyte infected and non-infected perennial ryegrass emit the most abundantly two green leaf volatiles (GLVs): (Z)-3-hexenal, (Z)-3-hexen-1-yl acetate, three terpenes: linalool, (Z)-ocimene, β -caryophyllene and three shikimic acid pathway derivatives: benzyl acetate, indole, and methyl salicylate. Infection of perennial ryegrass by pathogens can induce the higher emission of VOCs and production of phenolic compounds by the neighbouring E+ plants. Our results suggest that phenolics, PR Proteins and VOCs may play a crucial role in defense reaction of E+ perennial ryegrass against pathogens and in signaling between the plants.

Namsik Park

Professor and Director of Subsurface Reservoir Research Center, Dong-
A University, Korea

**A Simulation-Optimization Model for Pumping and
Injection wells of a Subsurface Reservoir**

Wet and dry seasons are clearly distinct in Korea due to the monsoon climate. Water shortages were common, and, with economic growth, large dams were built to store water during wet seasons. Currently, cities with millions of residents commonly rely on single large dams. To enhance water securities against anticipated climate change and natural/anthropogenic disasters, new water resources, disconnected from the current sources: rivers and dams, are needed. A research center was established to study potentials of subsurface reservoirs. A subsurface reservoir is formed by injecting surface water into an aquifer. Pumping wells are used to reclaim water. When problems arise at the surface water, injection can be completely stopped to protect the subsurface reservoir. Quality enhancement of injected water can be expected while flowing in the aquifer from injection wells to pumping wells. If a subsurface reservoir is built in a confined aquifer, the reservoir may be protected from ground-surface originated contaminations. Confined aquifers of significant extent are known to exist in deltas around the world. Surface water, although of poor quality, is abundant in delta areas. With proper treatment surface water can be injected safely into confined aquifers. Aquifers in delta area may contain groundwater of high salinity. Therefore, interaction between freshwater and saline water must be considered in building a subsurface reservoir in a delta. In this work a simulation-optimization model was developed to identify optimal locations and pumping and injection rates for groundwater wells. The objective function of the model was developed to maximize the performance of a reservoir. A genetic algorithm and a sharp-interface numerical simulation model were used.

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Margarita Gisela Pena-Ortega

Professor and Researcher, Chapingo Autonomous University, Mexico

Aureliano Pena-Lomeli

Researcher, Chapingo Autonomous University, Mexico

Karen Cartensen-Benavides

MSc Student, Chapingo Autonomous University, Mexico

&

Juan Martinez-Solis

Professor and Researcher, Chapingo Autonomous University, Mexico

**Molecular Characterization of Reference Husk Tomato
(*Physalis Ixocarpa* Brot.) Varieties through ISSR Markers**

Husk tomato is an important crop that has been subjected to a wide-ranging domestication process all across Mexico; therefore, there is an extensive genetic variability available. Consequently, it is convenient to characterize molecularly commonly cultivated varieties that are used as reference to classify new accessions or to register new improved varieties. Consequently, 12 husk tomato varieties belonging to eight different races were fingerprinted using ISSR (Inter Simple Sequence Repeat) markers. 22 ISSR primers produced a total of 208 bands, and 172 of them were polymorphic (representing 83 percentage of polymorphism). DNA fingerprinting table was constructed. Six primers were absolutely required for distinguish among tested cultivars. From those, UBC-835, UBC-873, and UBC-823 primers showed high discernment power, and therefore they could be very useful in further genetic studies in this crop. In addition, Jaccard's similarity coefficients between pairs of races were used to construct a dendrogram. The results obtained in this study showed that ISSR molecular markers can be used effectively for husk tomato cultivar identification.

Daniela Piaz Barbosa Leal

Researcher, Forschungszentrum Julich, Germany

Stephan Blossfeld

Researcher, Forschungszentrum Julich, Germany

Sylvia Morais de Sousa

Researcher, Embrapa Maize and Sorghum, Brazil

Kerstin A. Nagel

Researcher, Forschungszentrum Julich, Germany

&

Nicolai David Jablonowski

Researcher, Forschungszentrum Julich, Germany

Sorghum Root Architecture Subjected to Biogas-Digestate Application

Plants obtain water and mineral nutrients from the soil due their capacity to develop extensive root systems. To achieve greater sustainability within agriculture new strategies that will either reduce the nutrient demand of the crop or promote greater root recovery of the added fertilizer are required. Genetic variation for nutrient uptake can be exploited in breeding programs to improve sustainable production. In the present study, two genotypes of *Sorghum bicolor* subsp. *bicolor* (line 083 and line 134) from the sorghum diversity panel were used. These two sorghum genotypes differ mainly in relation to root system architecture, P uptake and grain yield. Thus, we aimed to assess which sorghum genotype shows higher biomass and nutrient uptake under organic and mineral fertilizer addition and the differences in root system architecture and rhizosphere pH using non-invasive methods. In a rhizotron experiment we evaluated the effects of the biogas-digestate (40 Mg ha⁻¹) applied as a fertilizer on root architecture, rhizosphere pH, nutrient uptake and biomass development of two sorghum genotypes in comparison to NPK fertilizer (five replicates). The biogas-digestate was composed of maize silage as the major feedstock, and minor amounts of chicken manure. Fertilizers were applied into the peat substrate. Plants were grown for 21 days. The measurements include: shoot and root dry mass; shoot nutrients content (C, N, P and K); leaf area; chlorophyll content (SPAD); root architecture; and soil elemental analyses. Rhizosphere pH was measured with planar optodes along the experimental period. Data are currently under analyses. We believe that this pilot study for sorghum can be scaled up to characterize a meaningful number of genotypes for breeding purposes.

Hemmatollah Pirdashti

Scientific Member, Sari Agricultural Sciences and Natural Resources University, Iran

Zahra Nouri

MSc. Student, Sari Agricultural Sciences and Natural Resources University, Iran

Valiollah Ghasemi Omran

Assistant Professor, Sari Agricultural Sciences and Natural Resources University, Iran

&

Yasser Yaghoubian

Ph.D. Student, Ramin Agricultural and Natural Resources University, Iran

Effect of Salt Stress on Some Physiological and Morphological Parameters of Stevia (*Stevia Rebaudiana* B.) Medicinal Plants under Controlled Conditions

Salt stress is one of the most limiting factors for sustainable crop production throughout adverse affects on physiological and morphological parameters which lead to decreasing the plant growth and development. Therefore, the present study aimed to evaluate the effect of salt stress on some physiological and morphological parameters of (*Stevia rebaudiana* B.) medicinal plant under tissue culture conditions. Experiment conducted at controlled conditions in Sari Agricultural Sciences and Natural Resources University based on completely randomized design with three replicates. Treatments were ten levels of salt stress (0, 30, 60, 90, 120, 150, 180, 210, 240, 270 and 300 mM of NaCl). Fourteen days subsamples were transferred to salt stress conditions and then some physiological and morphological parameters were determined at two stages (10 and 20 days after planting). Results of data analysis showed that salt stress had a highly significant effect on plant height, leaf number, node number, root length, electrolyte leakage in both stages. Stevia plant height, leaf and node numbers linearly increased as salt stress was increased. Slopes of these parameters were -0.0167, -0.0248 and -0.0129 in the first stage and -0.0344, -0.0382 and -0.0206 in the second stage of salt stress treatments. Quadratic and segmented equations were fitted to predict the relationship between electrolyte leakage and root length of stevia plantlets in different salt stress levels, respectively. In conclusion, it seems that regression analysis can be used to describe stevia growth behaviors under salt stress.

Eva Ramos Martinez

Ph.D. Student, IMM-FluIng, Universitat Politecnica de Valencia, Spain

Manuel Herrera

Research Associate, Imperial College of London, U.K.

Joaquin Izquierdo

Professor, IMM-FluIng, Universitat Politecnica de Valencia, Spain

&

Rafael Perez Garcia

Professor, IMM-FluIng, Universitat Politecnica de Valencia, Spain

Multi-Agent Approach to Biofilm Development in Water Supply Systems

The presence of regulated quantities of residual disinfectant is a usual feature in water supply systems (WSSs); nevertheless, biofilm formation persists in all of them, representing a paradigm in the WSSs management due to the numerous undesirable problems associated. This study attempts to create a biofilm model based on a limited number of basic interactions between bacteria and hydraulic and physical characteristics of the pipes by the step-wise evolution of biofilm over time. Multi-Agent Systems (MASs) will be used as modelling tool to achieve this purpose, arising as an excellent starting point for further researches. A MAS consists of a population of autonomous entities (agents, biofilm bacteria in this case) situated in a shared structured framework (environment, pipes in this case). These agents operate independently but also are able to interact with their environment, coordinating themselves with other agents. By obtaining a MAS based biofilm model, it will be possible to achieve a better understanding on any situation of interest because different research scenarios could be simulated allowing to check hypothesis on their mechanisms and to predict how biofilm evolves in WSSs.

Giedre Samuoliene

Senior Researcher, Lithuanian Research Centre for Agriculture and Forestry, Lithuania

Alina Ceidaite

Ph.D. Student, Lithuanian Research Centre for Agriculture and Forestry, Lithuania

Ramunas Sirtautas

Researcher, Lithuanian Research Centre for Agriculture and Forestry, Lithuania

&

Darius Kviklys

Senior Researcher, Lithuanian Research Centre for Agriculture and Forestry, Lithuania

Physiological Aspects of Biennial Bearing by Manipulating Crop Load in Apple Tree

Effect of crop load distribution within the apple tree on bearing behaviour was tested with 'Ligol' apple tree on P60 rootstock. The role, amount and ratio of phytohormones and non-structural carbohydrates was evaluated. Crop load was adjusted to 6 inflorescences per cm² of trunk cross-sectional area. The flower buds were thinned in May at pink bud stage as follows: even distribution on the tree - (I) control; from one side of tree - (II) bare side and (III) fruiting side; from individual branches throughout all tree - (IV) bare branch and (V) fruiting branch; and from inside and outside of the tree - (VI) bare inside and (VII) fruiting outside. Phytohormones and non-structural carbohydrates were analysed in axillary buds in mentioned treatments; yield indices were evaluated for the whole tree in October. Return bloom was evaluated in May. Results shows that JA is associated with flower induction and gibberellins (GA₁, GA₃, GA₇) - with flower inhibition in apple tree, as higher amounts of JA and lower GAs levels were found in buds of these treatments where inflorescences were removed in spring. In opposite to bare side, higher zeatin and IAA contents were found in bare branch and bare inside. Significantly lower ABA contents were detected in all treatment in comparison to even distribution of inflorescences. Significantly higher total amount of non-structural carbohydrates, due to significant increase of glucose, was detected in buds where inflorescences were not removed. Strong correlation between ABA to sucrose was found. Strong negative correlation between ABA to sucrose and IAA to glucose shows increased contents of floral inhibitors lead to decrease of sugar signalling molecules in treatments where flowers were not removed. Such data suggests that localized flowering inhibition depends on

critical ratio of inhibitor and promoter signalling molecules that are exported to buds. The lowest total yield and yield per tree was found when inflorescences were removed from individual branches throughout all tree. There were no significant differences in fruit weight. The most intensive return bloom was found when buds were removed from one side of tree. Such results were obtained due to hormonal and sugar signalling flowering stimulus in buds of treatments where inflorescences were removed, thus better return bloom in next spring was achieved.

Tolga Sariyer

Research Assistant, Canakkale 18 Mart University, Turkey
&

Canan Oztokat Kuzucu

Assistant Professor, Canakkale 18 Mart University, Turkey

Effects of Proline Applications on Yield and Quality Parameters in Kapija Pepper Grown Under Different Irrigation Levels-2

Turkey is among the countries at risk in terms of global warming and it's necessary to make precautions for drought. Effects of drought stress to fatty acid composition of kapija pepper is unknown and previous studies done about exogenous proline applications to plants in drought stress. This research conducted at research and practice field of Çanakkale 18 Mart University for determine to effects of different irrigation levels and proline applications on some fatty acid composition of Yalova Yağlık-28 (*Capsicum annum L. cv. Kapija*) pepper variety. This experiment completed on factorial setted randomized block design with 3 replications. Plants supplemented with 3 different irrigation intervals (Kcp1: 0.5, Kcp2: 1, Kcp3: 1.5) and proline applications used for per intervals. Some fatty acids as linoleic, alpha linolenic and palmitic acids are the major acids in all treatments. Effects of drought and proline applications on fatty acid composition of Yalova Yağlık-28 (*Capsicum annum L. cv. Kapija*) were statistically significant.

Florencia Charito Sebastian

Associate Professor, University of the Philippines, Philippines

Examination of the Philosophy of Cooperative Action as Applied to Philippine Community Forestry

This paper looks into the philosophical imperatives of collective action as applied to communal forestry in the Philippines. A product of a case study confirming the assessment of general reviews of the failure of communal forestry program in the Philippines, this article found the need to create a livelihood that would encourage cooperation—a livelihood that the community should do together to develop a cooperative lifestyle among the members. The author sees this type of livelihood as a solution to the massive deforestation and poverty in upland forest communities. An old example of this livelihood is hunting which requires group effort. Another is that generated from the rice terraces of northern Philippines with a land-use system that is founded on a family tenure on the forest lots called “muyong” which provide irrigation for the rice fields and water for settlements and fishponds below. The key to the success of these pursuits in forest management is a well-thought out restraints to free riding activities. These restraints should be developed not only through moral suasion and regulation but through the nature of the activities themselves which makes cooperation inevitable. The philosophical underpinning of the problem is the motive of sociability in economic collective action and the principle behind the effort to sustain it. Hence the study asks the philosophical questions “Is sociability innate human character or merely developed and conditioned by economic and self-interested imperatives, in particular the nature of the economic activities?” “If sociability is conditioned by the nature of economic activities, should these economic activities be encouraged by institutionalizing programs to develop them?” “Or should those communities with a highly-entrenched sociability culture be the only ones to be awarded the forest land stewardships and corresponding development assistance?”

Mordechai Shechter

Senior Research Fellow, University of Haifa, Israel

Economic Aspects of Adaptation to Climate Change: Findings of Israel's Climate Change Information Center (ICCIC)

This paper describes the process of developing a national scientific knowledge base that will support the evolvement of the national adaptation plan, focusing on economic aspects. The research work included gathering and integration of available research and policy documents concerning adaptation to climate changes, in order to identify knowledge gaps, to recognize all the risks and implications of climate change and to propose a national policy of adaptation.

The research process comprised of three main steps to build climate change adaptation policies:

1. Building climate scenarios and economic growth scenarios to identify possible effects of the climate change phenomenon.
2. Scanning possible adaptation measures and their implementation urgency
3. General assessment of the adaptation measures using existing systems and/or experts' feedback.

The work was based on survey of various measures to cope with climate change in order to determine the economic resources that should be invested, even if the effects of climate change turn out to be less severe. These options are defined as "*No Regret*" alternatives. The specific areas that were investigated include the climate changes that are predicted for the next 50 years are presented, and specific policies for water resources, public health, bio-diversity and green building. In addition, the intra-connections amongst the above-mentioned areas are analyzed in a multi-disciplinary concept using economic perspectives.

The three main recommendations include the following:

- (1) enhance significantly the availability of information;
- (2) water resources strategy should be changed from managing water supply to prioritizing and managing the water demand;
- (3) expand the regulation scope supporting the autonomous adaptation actions.

In addition to the economic-perspective recommendations, the study suggested major research knowledge gaps that should be fulfilled regarding the implication of the climate change phenomenon in Israel.

Asma Souissi

Ph.D., Student, High School of Agriculture in Mograne, Tunisia

Abdallah Benalaya

Professor, High School of Agriculture in Mograne, Tunisia

&

Amal Mejri

Engineer Student, High School of Agriculture in Mograne, Tunisia

The Effects of Consumer's Water footprint of Agricultural Products on Food Security in Tunisia

Today, agricultural production systems provide substantial amounts of diversified products. However, the degradation of natural resources, including water, is threatening the food security especially in developing countries. Tunisia is one of the most threatened countries by water scarcity. The country faces increasing pressure on the mobilized water resources while maximizing the level of national food security still a major challenge.

The water footprint of consumption is defined as the volume of freshwater used to produce the goods consumed by a country, a city, an individual or group of individuals. It is an indicator of the direct and / or indirect water use by the consumer. This notion is close to the concept of "virtual water" defined as the volume of water incorporated into a product traded internationally.

Through the analysis of the "consumption water footprint" of major food products, we try to show the link between the water footprint and food security even though the evaluation remains multidimensional and complex. Based on the method developed by the "Water Footprint Network", which evaluates inventory consumed or polluted water flows by both vegetal and livestock products, we estimated the water footprint of food consumption of the average Tunisian and found that it has increased by approximately 356 cubic meter / person / year (the equivalent of 978 l / capita / day) over the last 30 years. An important part of the footprint basically consists of the contribution of cereals. Although cereal consumption decreased over the years, the water footprint especially in urban areas increased because of the augmentation of animal products consumption. This gradual increase in food consumption water footprint is a warning signal and urges us to consider effective ways to control it.

A.J. Stagliano

Professor, Saint Joseph's University, USA

Climate Change Accountability: Do Firms Adequately Disclose the Financial Consequences of the EU-ATS?

Policy makers, scientists, industry leaders, and academicians regularly debate how to avert disruptive climate change events, restrain global warming, reduce greenhouse gas (GHG) emissions, and preserve the physical environment. Three main methods have been used to achieve these goals: command and control laws/regulations, carbon taxes, and cap and trade schemes.

Recognizing the potential for significant negative consequences of climate change, Norway, Denmark, Sweden, and Finland introduced carbon emissions taxes during the 1990s. These nations also ratified the Kyoto Protocol that operated from 2005 through 2012; the European Union (EU) instituted a carbon trading scheme (the Emissions Trading System, or ETS) at that same time. Scandinavian EU members had two methods in place during the 2005-08 period to facilitate GHG reduction: taxing and trading. Norway, not in the EU, used just taxation. Greece, and the other EU members, had only the carbon ETS mechanism to effect compliance with the Kyoto Protocol.

The basic research issue addressed here is this: Did publicly held firms headquartered in Greece adequately report their participation in the EU carbon emissions trading mechanism? Is there transparency in reporting the economic consequences of climate change by Greek firms?

Data to answer these questions are obtained from the 2012 and 2013 annual financial reports for every domestic Greek public company that received tradable emissions permits. In addition to determining investor-owned firms' disclosure posture, the specific method of accounting for these ETS allowances—whether companies used, banked, or sold the permits granted by the government—also is developed in detail. This empirical research endeavor reports on a complete survey of all available data for the two most recent fiscal periods as a means of assessing financial disclosure transparency of climate change amelioration efforts in Greece.

Talel Stambouli

Assistant Professor, Ecole Supérieure d'Agriculture de Megrane,
Tunisia

Benalaya Abdallah

Ecole Supérieure d'Agriculture de Megrane, Tunisia

Hammami Rifka

Institut National de la Recherche Agronomique de Tunisie, Tunisia

Laajili-Ghezal Lami

Ecole Supérieure d'Agriculture de Megrane, Tunisia
&

Souissi Asma

Ecole Supérieure d'Agriculture de Megrane, Tunisia

Virtual Water Balance Estimation in Tunisia

The virtual water concept, defined by Allan (1997), as the amount of water needed to generate a product of both natural and artificial origin, this concept establish a similarity between product marketing and water trade. Given the influence of water in food production, virtual water studies focus generally on food products. At a global scale, the influence of these product's markets with water management was not seen. Influence has appreciated only by analyzing water-scarce countries, but at the detail level, should be increased, as most studies consider a country as a single geographical point, leading to considerable inaccuracies.

The main objective of this work is the virtual water balance estimation of strategic crops in Tunisia (both irrigated and dry crops) to determine their influence on the water resources management and to establish patterns for improving it. The virtual water balance was performed basing on farmer's surveys, crop and meteorological data, irrigation management and regional statistics.

Results show that the majority of farmers realize a waste of the irrigation water especially at the vegetable crops and fruit trees. Thus, a good control of the cultural package may result in lower quantities of water used by crops while ensuring good production with a suitable economic profitability. Then, the virtual water concept integration in the production systems choice and policies affecting the use of water is very useful to save over this scarce resource and to support farmers in their production activities and maintaining the sustainability of farms.

Robert Toman

Associate Professor, Slovak University of Agriculture in Nitra, Slovakia

Svatoslav Hluchy

Professor

&

Zuzana Hajkova

Ph.D. Student, Slovak University of Agriculture in Nitra, Slovakia

Effect of Separate Diazinon Administration and Co-Administration with Selenium and Cadmium on their Tissues Concentrations in Rats

The accumulation of diazinon (DZN), selenium (Se) and cadmium (Cd) in the selected tissues of rats after various ways and combinations of administration were analyzed. Male rats were dosed with diazinon, cadmium and selenium in following concentrations: diazinon 20 mg kg⁻¹ b.w., intraperitoneally (i.p.), and 40 mg L⁻¹, per os (p.o.) in drinking water, selenium 2 mg kg⁻¹ b.w., i.p., and 5 mg L⁻¹, p.o. in drinking water, and cadmium 2 mg kg⁻¹ b.w., i.p., and 30 mg L⁻¹, p.o. in drinking water. The diazinon was administered i.p. and p.o. alone (DZN) or co-administered with selenium (DZN+Se) and selenium+cadmium (DZN+Se+Cd). 36 h after i.p. and after 90 days of p.o. administration of compounds, the samples of liver, kidney, adipose tissue and muscle tissue (*m. quadriceps femoris*) were collected and content of DZN was analyzed using Gas Chromatography–Mass Spectrometry (GC-MS), Cd was analyzed using an Electrothermal Atomic Absorption Spectrometry (ETAAS) and Se using a Hydride Generation Atomic Absorption Spectrometry (HG-AAS) methods. Cd significantly increased in liver, muscle and adipose tissue after i.p. DZN+Se+Cd co-exposure (p<0.01) and in liver and kidney after p.o. DZN+Se+Cd administration (p<0.01). Se significantly increased in liver and kidney of DZN+Se and DZN+Se+Cd i.p. and p.o. exposed rats (p<0.01), and in muscle (p.o.) and adipose tissue (i.p.) of DZN+Se+Cd groups (p<0.01). Diazinon significantly increased only in the adipose tissue of rats intraperitoneally administered with DZN (p<0.01), DZN+Se (p<0.01), and DZN+Se+Cd (p<0.05). The results indicate that cadmium and selenium accumulate in liver, kidney, muscle and adipose tissue after i.p. and p.o. administration but diazinon concentrations increase only if administered intraperitoneally alone or with Se and Cd. The co-administration of diazinon, Se and Cd affects the content of these compounds in the organism and the accumulation rate depends on the combination of administered compounds.

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Dildeep Varadan

Assistant Professor, Kerala Veterinary & Animal Sciences University,
India

Babitha Vazhoor

Assistant Professor, Kerala Veterinary & Animal Sciences University,
India

R.S. Dass

Principal Scientist, Deemed University, India
&

A.K. Garg

Principal Scientist, Deemed University, India

**Ameliorative Effect of Dietary Zinc and Rumen Protected
DL-Methionine on Nitrogen, Calcium and Lead Retention
Alterations Induced by Lead Toxicity in Goats**

Lead (Pb) is a cumulative poison, with duration of exposure as significant as level of exposure. It is used in paint, batteries, soldering, pottery glaze, sewer piping, gasoline, ammunition, jewels, toys and cosmetics. Various reports based on research works attributed higher levels of lead in animal feeds due to environmental contamination. Conventional chelators such as calcium versenate (calcium disodium EDTA) and di-mercapto succinic acid (DMSA) have been used to ameliorate the toxicity of lead, but many adverse side effects such as nephrotoxicity have been observed. The present study aims to ameliorate the toxic effects of lead in feed through the addition of dietary ameliorative agents. Thirty male kids { 2-3 months age, 8.3 ± 0.28 (Kg) body weight } were divided into five groups of 6 animals each on the basis of body weight following randomized block design and fed either basal diet (Control, G-1) or basal diet supplemented with 250 ppm lead in groups, G-2, G-3, G-4 and G-5 for a period of 150 days. Dietary treatments included Zinc (Zn) (250 ppm in G-3), rumen protected dl-methionine (250 ppm in G-4) and Zn + protected dl-methionine (250 ppm each in G-5) as ameliorating agents. Lead was supplemented in the diet as lead acetate, Zinc as Zinc sulphate and methionine as rumen protected DL- methionine. Consequent to the metabolism trial conducted after the feeding trial significant ($p \leq 0.05$) reduction in nitrogen and calcium (Ca) retention in all the lead supplemented groups were observed. Excretion of lead through feces and urine were significantly ($p \leq 0.05$) higher in Pb supplemented groups. Higher excretion of lead through urine in G-5 where rumen protected dl-methionine was used, reflected in significant ($p \leq 0.05$) lower retention of Pb in this group. Supplementation of dl- methionine

provides the sulfhydryl groups for glutathione (GSH) formation and the lead-GSH complex gets excreted which might have resulted in the lower retention of lead. It can be concluded that dietary inclusion of rumen protected dl-methionine in goats can have commendable protective effect against higher levels of lead in feed.

Babitha Vazhoor

Assistant Professor, Kerala Veterinary & Animal Sciences University,
India

Dildeep Varadan

Assistant Professor, Kerala Veterinary & Animal Sciences University,
India

G. Taru Sharma

Principal Scientist, Deemed University, India
&

Mihir Sarkar

Principal Scientist, Deemed University, India

Expression and Localization of Vascular Endothelial Growth Factor and Its Receptors in the Ovarian Follicle during Estrous Cycle of Water Buffalo (*Bubalus Bubalis*)

Numerous works have been conducted in bovines on the expression pattern of one of the most crucial angiogenic cum local ovarian factors namely, vascular endothelial growth factor (VEGF) but there is a striking dearth of similar studies in buffaloes, which contribute 55% of the total milk production in India. Hence we took up the present study to investigate the temporal patterns of gene expression of VEGF isoforms and VEGF receptors during ovarian follicular growth, development and maturation in buffalo (*Bubalus bubalis*). Follicles were grouped into four, depending on diameter and the concentration of estradiol- 17 β (E2) in follicular fluid (FF): Group I (small), 4–6 mm diameter, E2 > 0.5 ng/ml of FF; Group II (medium), 7–9 mm, E2 = 0.5–5 ng/ml; Group III (large), 10–13 mm, E2 = 5–40 ng/ml; Group IV (pre-ovulatory), >13 mm, E2 > 180 ng/ml). To further define the maturational state of each group, mRNA expression status of FSH receptor (FSHR), LH receptor (LHR) and aromatase (CYP19A1) in theca interna and granulosa layers was also looked into. The relative amounts of VEGF isoforms (120, 164, and 188 amino acid forms), as ascertained by quantitative real-time PCR (qRT-PCR), portrayed a steady rise with increase in follicular size in both the granulosa (P < 0.05) and theca layers. Relative mRNA expression of VEGF receptors (VEGFR-1 and VEGFR-2) was minimum in granulosa cell (GC) and theca interna cell (TI) layers of Gp-I follicles but the quantity of mRNA transcript for VEGFR-2 increased in the granulosa layer with increase in follicle size hitting the highest level in Gp-IV follicles (P < 0.05). Agreeing closely with the gene expression results, relative expression pattern of VEGF isoforms and receptor protein in follicle lysates, as deduced from western blotting, depicted a steady rise throughout

follicular growth and maturation to record peak amounts in pre-ovulatory follicles. In consensus with the above results, a clear localization of VEGF isoforms and receptors in both steroidogenic cell types (GC and TI) and of VEGF receptors in the vascular endothelial cells of the thecal blood vessels was demonstrated by immunohistochemistry with the most conspicuous fluorescence observed in pre-ovulatory follicles as against other smaller follicles. Summarizing, the increase in mRNA expression of VEGF isoforms and the receptor (VEGFR2) with follicular growth to reach a maximum in the pre-ovulatory follicles suggest and reinforces the assumption that VEGF may contribute to the extensive capillary proliferation associated with the increase in size, selection, and maturation of the pre-ovulatory follicles. This may in turn facilitate follicle maturation by enhancing the supply of nutrients, hormones, and other essential blood-borne signals to the follicle. Of late, VEGF is in scientific focus by virtue of its recently recognized, non-angiogenic mechanisms which in concert with its classic angiogenic role promotes growth and maturation of follicles.

Yinping Wang

Ph.D. Student, Nanjing Institute of Geography and Limnology,
China

The Fate of ^{15}N -Enriched Cyanobacteria Feed by Planktivorous Fish in an Enclosure Experiment: A Stable Isotope Tracer Study

A tracer experiment using isotope ^{15}N studied the assimilation and retention of nitrogen from feces by two planktivorous fish, silver carp (*Hypophthalmichthys molitrix*) and tilapia (*Oreochromis niloticus*), in Lake Taihu (China). The *Microcystis* was enriched with ^{15}N - NH_4Cl and lyophilized to produce feed for fish and traced to establish the fate of feces nitrogen. Samples of organisms and abiotic substances for excess ^{15}N and nutrients concentration in the water column were determined on days 0, 1, 5, 10, 15 and 20. Nutrient concentration analyses indicated that TN and TP were about 4 times higher in the tilapia enclosure than in the silver carp enclosures due to tilapia's digestion capacity of *Microcystis*, which suggests the ichthyo-eutrophication potentials of the two fish species in the following order: tilapia > silver carp. 11.05% ^{15}N was assimilated by tilapia compared to 3.58% ^{15}N detected in silver carp, which suggests tilapia has a higher capacity to assimilate and retain *Microcystis* nitrogen than silver carp, but the absorptivity were relatively low. At the end of the experiment, 8.48% ^{15}N was detected in sedimentary detritus in the tilapia enclosure compared to 6.07% ^{15}N in the silver carp enclosure, which suggests that little *Microcystis*-derived nitrogen was sinking to the bottom. In conclusion, much of the *Microcystis*-derived nitrogen were neither assimilated by fish nor accumulated on the sediment floor, presumably floated in the water column and made contribution to phytoplankton propagation and aggravates the water quality.

Phenchan Whijitara

Agricultural Research Officer, Ministry of Agriculture and
Cooperatives, Thailand

Good Practices on Pineapple 'Trat Si Thong' Production in Eastern Thailand

Pineapple 'Trat Si Thong' cultivar is the most popular fresh cut pineapple and the good quality products are valuable for growers to meet with both domestic and international demand. This study aimed to determine good practices on pineapple production with farmer-participation and to find out an appropriate technology for growers to increase good quality products and farm income. The study was conducted in Trat province, eastern Thailand in the Crop Year 2013 – 2014. The findings revealed that average fruit weight was 1.38 – 1.90 kilograms per fruit. The value of TSS was 14.83 ± 1.24 °Brix and TA was 0.73 %, respectively. Good quality products based on standard market demand had increased by 9.18 %. Average production cost was 79,862.50 baht (US\$ 2,420.08, 1 US\$=33 baht) per hectares per crop. Average net earnings was 89,394.63 baht (US\$ 2,708.93) per hectares per crop. The standard quality products, growers were gained average net earnings had increased by 20.71 %. Concerned growers were most recognized on recommended technologies regarding fertilizer application, grading suckers, flower induction, and harvesting.

Min-Hsien Yang

Professor, Feng Chia University, Taiwan

Total Factor Productivity Growth and Convergence Testing in Asian Agriculture under Open Economy

Most of Asian countries are developing countries with small farming economy. Based on food security, farmers' income and different stages of economic development considerations, government usually intervenes and dominates agriculture by R&D, technical extension, market promotion, and all kinds of protection measures. However, those trade barriers like tariff and quota to restrict import, and protect domestic production by price support and input subsidies have been reducing since the Agreement on Agriculture implemented in 1995.

While increasing of international trade in agricultural goods, it is expected significant of technical spillover effects along with international trade activities. If there is a tendency in convergence effects on agricultural productivity and efficiency, it would strengthen the proposal for trade liberalization in agriculture.

This paper applies sequential Data Envelop Analysis (DEA) based on agricultural output and inputs of 15 Asian countries during period of 1961 to 2012. It estimates efficiency change, technical change, and total factor productivity (TFP) change by output oriented Malmquist index. These estimation outcomes can be further tested convergence effects and determinants of productivity and efficiency.

The results indicate there is no convergence tendency in agricultural TFP change among Asian countries after 1995. Production efficiency has been increasing countrywide, but technical change need to be break through. It implies it is not easy task to change internal production structure caused from external technical spillover effects owing to trade liberalization. Besides, the main determinants for TFP are R&D expenditures and capital formation in agriculture. It reveals the importance of agricultural basic environment and infrastructure. Contrast to the similar features among Taiwan, Japan and South Korea, there is a significant convergence effects on these three countries' TFP change. It also implies a conditional convergence based on well-done infrastructure, but not trade liberalization. The results can be understood reasons why most of Asian countries are not interested about agricultural negotiation in WTO.

Kunpeng Yi

Postdoc, Institute of Remote Sensing and Digital Earth, Chinese
Academy Sciences, China

Farmer Participation Network Platform towards Crop Observation and Sample Data Collection

China is a large agriculture country with about 2 billion Mu of cultivated land and over 0.8 billion farmers, which means China have to feed 1.3 billion people with limited cultivated land resources. Accordingly, yearly grain yield is a significant indicator for government to make macro decision in China. During the past several years, our research group made a lot of efforts in global crop monitoring and national grain yield evaluating in China. A China's global crop-monitoring system (CropWatch) was produced by combining with multiple remote sensing datasets. To improve our assessment accuracy, we need to obtain a lot of field data to determine key crop production indicators: crop acreage, yield and production, crop condition, cropping intensity, crop-planting proportion, total food availability, and the status and severity of droughts. Every year we spend a large amount of time and money to conduct field survey across a vast spatial area across the country. Even that, the sample data still can't meet our needs. Therefore, we should find a new idea to get enough sample data efficiently and frequently. Citizen science can provide scientific activities with make longstanding, meaningful contributions, including the ability to sample large spatial scales; use large quantities of citizen resources to collect labor-intensive data; gather data on private land; and examine data over long periods of time. In this research, we intend to achieve and share a national scale real-time crop observation and sample data collection method by building a farmer participation network in China. 200 typical agriculture counties are selected according to crops producing area map. We make a partnership with one farmer for each county. The farmer partners are arranged to carry out appointed crop sample data collection or observation. GPS technology is used for locating the sample plot and matching with satellite image. All sample materials are expressed to our research center by using logistics network. For sample digital data, such as sample photos with geospatial information, we design a cell phone application with cloud technology which can deliver these digital data directly to our research center by cloudsync. The data from 200 counties, which covered main grain-producing area in China, can be collected in 3 or 4 days by utilizing this network platform. We grasp a concept of "All for One, One for All" to build a scientific network

platform for data collecting and sharing in the future. This platform was designed to sever not only domestic research needs, but also for all international organizations.

Junko Yoshida

Graduate Student, Mie University, Japan and Ghent University,
Belgium

Hiroshi Ehara

Professor, Mie University, Japan

Norihiko Tomooka

Unit Leader, Genetic Resources Center, National Institute of
Agrobiological Sciences, Japan

&

Hitoshi Naito

Professor, Kurashiki University of Science and The Arts, Japan

Growth and Physiological features of Wild *Vigna* Species under NaCl Treatment

The *Vigna* species of legume are one of the important protein resources in the tropics. Some wild species of the genus *Vigna* can grow under severe environment such as saline condition. In this study, total of seven accessions from three species (two of *V. marina* (Burman) Merrill., three of *V. luteola* (Jacq.) Benth. and two of *V. vexillata* (L.) A. Rich.) were used to compare their growth and physiological responses against salt stress. Seedlings grown in hydroponics for 13 days were exposed to NaCl in culture solution, 50mM for 4 days, 100mM for 6 days and finally 150mM for 10 days. At the end of the treatment, five accessions (two of *V. marina*, two of *V. luteola* and one of *V. vexillata*) survived under salt stress condition. Thus, the effect of the NaCl treatment on the growth and physiological features was compared between the control and treated plants among the five accessions. Sodium ions were accumulated highly in the leaves compared with the other parts in the treated plants of *V. marina*. In contrast, the Na⁺ concentration in the leaves of the treated plants in *V. luteola* and *V. vexillata* was lower than that in *V. marina*. Therefore, two accessions of *V. marina* were considered to be salt-tolerance type, and the survived accessions of *V. luteola* and *V. vexillata* were considered to be salt-avoidance type that could reduce the translocation of Na⁺ to the leaves. In *V. marina* and an accession of *V. luteola*, the photosynthetic rate increased with the NaCl treatment, which was attributed to the increasing of chlorophyll content per unit leaf area and transpiration rate with stomatal conductance related to sufficiently larger stomatal aperture under salt stress condition. As described above, there were apparent inter- and intra-specific differences in mechanism of salt resistance in the genus *Vigna*.

Jose Edgar Zapata Montoya

Professor, Universidad de Antioquia, Colombia

Natalia Andrea Gomez Grimaldos

Professor, Universidad de Antioquia, Colombia

&

Leidy Johana Gomez Sampedro

Professor, Universidad de Antioquia, Colombia

Time of Hydrolysis as Function of Substrate Concentration and Enzyme/Substrate Ratio in the Kinetic of Enzymatic Hydrolysis of Bovine Plasma Protein

Hydrolysis with Alcalase 2.4 L, at constant pH and temperature of 61.5 ° C was performed using the pH-stat method to set the hydrolysis degree (HD) with Titrand 842. Considering the effect of initial substrate concentration (S_0) (22-42 g / L) and the ratio enzyme/substrate (E/S) (10-40%), with objective of determining the time necessary to obtain a HD of 20% in the process of enzymatic hydrolysis bovine plasma proteins (BPP), through experiments in a factorial design with two factors and three levels, adding a kinetic modeling hydrolysis mechanism. $HD = (1/b) \ln(1 + b \cdot a \cdot t)$ indicating the relationship between the degree of hydrolysis (DH) and the time(t) is established. In system BPP-Alcalase 2.4L, the reaction mechanism may be derived from a number of experimental different concentrations of substrates and enzyme concentrations. The reaction kinetics and the kinetic constants (K_2 , K_3 and K_M) were calculated from empirical equations. The results of the nonlinear regression of the kinetic model are near to the experimental data, the average relative error was less than 5%. In conclusion, the kinetic equations can be used to adjust the process of enzymatic hydrolysis of BPP and to optimize the operating parameters of the preparation of bioactive peptides in biorreactor. The results suggest that the adjustment data of third order polynomial model with an R^2 of 0.9745, this model is optimized to minimize downtime and maximize S_0 hydrolysis, making the best conditions are 42 g/L of S_0 and 35.4% of E/S, in which the DH of 20% was experimentally achieved in a time of 11.1 ± 1.1 min.

Luo-Ping Zhang

Professor, Xiamen University, China

Hongni Xu

Master Student, Xiamen University, China

Huaxia Sheng

Ph.D. Student, Xiamen University, China

&

Weiqi Chen

Professor, Xiamen University, China

Evaluation of Marine Ecosystem Intrinsic Value

Marine ecosystem valuation is the basis of scientific support for the strategic decision-making in marine and coastal areas. So far the most popular methods for ecosystem valuation are ecosystem service valuation, which is based on the utility of ecosystem to human being, but not on the full objective value of ecosystem. And there is no any valuation approach and method with the perspective of ecosystem itself.

In this paper, the ecosystem intrinsic value (EIV) was defined. EIV is an objective value that emerges from the existence of ecosystem, and independent of human will and any instrumental usefulness for limited human purposes, but dependent on the substance, energy and information expressed by the structure, processes and functions of ecosystem, and its existence. It is the base of any ecosystem services value.

The valuation approach and methods for EIV were developed by using Emergy and Eco-exergy analysis. The EIV calculated by Emergy from the substance, energy and information of ecosystem represents the existent value of ecosystem. The EIV calculated by Eco-exergy from the structure and function of ecosystem represents the externally working capacity of ecosystem. They represent the stock and flow of EIV, respectively.

The approach and methods of EIV evaluation were applied to Xiamen Bay, China. The results showed that the marine EIV in Xiamen Bay was RMB 209 billion including RMB 116 billion of emergy and RMB 92.7 billion of eco-exergy in 2010. The EIV in unit area of Xiamen Bay is nearly 10 times higher than the average ecosystem services value in the World estuaries calculated by Costanza et al. (1997). It implies a potential undervaluation to ecosystem value by the calculation of ecosystem service valuation, and thus may mislead decision-making process.

Xin Zhao

Chief Engineer, Changjiang River Scientific Research Institute, China

A 3D Modeling for Eutrophication in the Daning River, Three Gorges Reservoir Area, China

Aiming at the problem that lacking effective tools on algae bloom control by hydraulic regulation in the Three Gorges Reservoir Area, China, A 3D eutrophication model was constructed based EFDC eutrophication module using meteorological, hydrological and water quality data of 2010 and 2011 in Dachang section and Daning River estuary. Measured data of Shuanglong section were employed for model calibration and validation. Results show water temperature modeling works best, simulated and observed values are highly consistent and error statistics are also small, simulated and observed values of total nitrogen and total phosphorus have some bias, but still have good fitness; there are some large errors in chlorophyll-a simulation, but change trends were still very well simulated. This model may provide technical support. for controlling algae bloom by hydraulic regulation..