THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book:

International Symposium on
Animal Science & Zoology
10-13 July 2017, Athens, Greece

Edited by
Gregory T. Papanikos

2017

Abstracts

International Symposium on

Animal Science & Zoology

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(In Alphabetical Order by Author's Family name)

Preface

This book includes the abstracts of all the papers presented at the *International Symposium on Animal Science & Zoology, 10-13 July 2017*, organized by the Athens Institute for Education and Research (ATINER).

In total 20 papers submitted by presenters coming from 15 different countries (Belgium, Benin, Cameroon, Chile, China, Israel, Lithuania, Mexico, Romania, Saudi Arabia, South Africa, South Korea, Turkey, UK and USA). The conference was organized into 8 sessions that included a variety of topic areas such as animal production, animal health and more. A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER 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 to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven research divisions and 37 research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

Gregory T. Papanikos
President

All ATINER's conferences are organized by the Academic Committee (https://www.atiner.gr/academic-committee) of the association.

This conference has been organized with the additional assistance of the following academics, who contributed by chairing the conference sessions and/or by reviewing the submitted abstracts and papers:

1. Gregory T. Papanikos, President, ATINER.
2. Chansheng He, Professor and Director, Lanzhou University, China.
3. Janusz Zwiazek, Professor, University of Alberta, Canada.
4. Sinan Ogun, Academic Member, ATINER & Head, RR Research & Development Ltd., Turkey.
5. Monif AlRashidi, Dean of Scientific Research, University of Ha'il, Saudi Arabia.
6. Muhammad Farooq Hussain Munis, Assistant Professor, Quaid-i-Azam University, Pakistan.
7. Christos Tachtatzis, Lecturer – Chancellor's Fellow, University of Strathclyde, UK.
8. Vassilis Skianis, Research Fellow, ATINER.
9. Olga Gkounta, Researcher, ATINER.
10. Hannah Howard, Research Assistant, ATINER.

FINAL CONFERENCE PROGRAM
International Symposium on Animal Science & Zoology,
10-13 July 2017, Athens, Greece

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

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

Monday 10 July 2017

08:00-09:00 Registration and Refreshments

09:00-09:30 (Room B-10th Floor) Welcome and Opening Address

Gregory T. Papanikos, President, ATINER.

09:30-11:00 Session I (Room C-10th Floor): Animal Production

Chair: Vassilis Skianis, Research Fellow, ATINER.

1. Christos Tachtatzis, Lecturer – Chancellor's Fellow, University of Strathclyde, UK, Craig Michie, Reader, University of Strathclyde, UK & Ivan Andonovic, Professor, University of Strathclyde, UK. Cloud-based Animal Health Service Provision.
2. Jonas Jatkauskas, Senior Scientist, Lithuanian University of Health Sciences, Lithuania & Vilma Vrotniakiene, Senior Scientist, Lithuanian University of Health Sciences, Lithuania. Using Various Lactic Acid Bacteria Inoculants during Ensiling Different Forages towards Fermentation, Nutritive Value and Aerobic Deterioration.
3. Gulsah Kanbur, Researcher, Selcuk University, Turkey, Yusuf Cufadar, Professor, Selcuk University, Turkey & Rabia Gocmen, Research Assistant, Selcuk University, Turkey. Effect of Different Sources and Levels of Zinc on some Tissues Mineral Concentration in Laying Hens.
4. Kingsley Agbor Etchu, Director, Scientific Coordinator for Animal Production and Fisheries, Institute of Agricultural Research for Development (IRAD), Cameroon, Julius Enow Tabot, Researcher, Institute of Agricultural Research for Development (IRAD), Cameroon, Annabella Abongwa Ngengwi, Researcher, Institute of Agricultural Research for Development (IRAD), Cameroon & Olivier Sandra Ghomsi, Head of Poultry Unit, Institute of Agricultural Research for Development (IRAD), Cameroon. Reproductive Performance of Rabbit Does Fed Moringa Oleifera Leaf Meal (Molm) as a Protein Substitute to Soya Bean Meal.

11:00-12:30 Session II (Room C-10th Floor): Marine Ecology

Chair: Christos Tachtatzis, Lecturer – Chancellor's Fellow, University of Strathclyde, UK.

1. Gad Degani, Professor, MIGAL, Israel. Building a Model Based on the Morphology, Biology, Behaviour and Life Cycle of *T. v. Vittatus A*daptation.
2. Jerome Canei, PhD Student, Université de Mons, Belgium. Sandy Substrates: Morphological Adaptations of *Heteroconger hassi* (Congridae) & *Ammodytes tobianus* (Ammodytidae).

12:30-14:00 Session III (Room C-10th Floor): Water

Chair: Chansheng He, Professor and Director, Lanzhou University, China.

1. Jungwon Ji, Researcher, Ajou University, South Korea, Eunkyung Lee, PhD Student, Ajou University, South Korea, Youngje Choi, PhD Student, Ajou Univeristy, South Korea, Heechan Chae, Graduate Student, Ajou University, South Korea & Jaeeung Yi, Professor, Ajou University, South Korea. Flood Forecasting for Hydropower Reservoirs Using Neuro-Fuzzy Technique in North Han River.
2. Jaehwang Ahn, PhD Student, Ajou University, South Korea, Youngje Choi, PhD Student, Ajou Univeristy, South Korea, Eunkyung Lee, PhD Student, Ajou University, South Korea & Jaeeung Yi, Professor, Ajou University, South Korea. Analysis of Diversion Tunnel to Supply Water in Severe Drought Situation.

14:00-15:00 Lunch

15:00-16:30 Session IV (Room C-10th Floor): Ecology

Chair: Muhammad Farooq Hussain Munis, Assistant Professor, Quaid-i-Azam University, Pakistan.

1. <u>Anastasios Mazis</u>, PhD Student, University of Nebraska-Lincoln, USA, Jeremy Hiller, Research Manager, University of Nebraska-Lincoln, USA, Pat Morgan, Senior Scientist, Environmental Division, LICOR Biosciences, USA, Vincent Stoerger, Plant Phenotyping Facility Manager, University of Nebraska-Lincoln, USA & Tala Awada, Professor and Associate Dean of Research, University of Nebraska-Lincoln, USA. High Throughput Plant Phenotyping: A New Window to Natural Resources Management and Agricultural Research.
2. Jixi Gao, Professor, Nanjing Institute of Environmental Sciences, Ministry of Environmental Protection, China. Construction of Technique System of China's Ecological Protection Redlines.
3. Delin Xu, Research Assistant, Nanjing Institute of Environmental Sciences, Ministry of Environmental Protection, China. Spatial Heterogeneity in the Food Web of a Large Shallow Eutrophic Lake (Lake Taihu, China): Implications for Eutrophication Process and Management.

21:00-23:00 The Pragmatic Symposium of the Conference as Organized in Ancient Athens with Dialogues, Food, Wine, Music and Dancing but fine tuned to Synchronous Ethics

Tuesday 11 July 2017

07:30-10:30 Session V: An Educational Urban Walk in Modern and Ancient Athens

Chair: Gregory Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

11:00-12:30 Session VI (Room C-10th Floor): Special Issues I

Chair: Janusz Zwiazek, Professor, University of Alberta, Canada.

1. <u>Ofir Degani</u>, Research Group Leader, Molecular Phytopathology Lab, Migal - Galilee Research Institute, Israel, S. Dor, Migal – Galilee Research Institute, Israel, A. Meerson, Migal – Galilee Research Institute, Israel, O. Rabinowitz, Ministry of Agriculture and Rural Development, Israel, Y. Goldblat, Tel-Hai College, Israel & D. Movshowitz, Tel-Hai College, Israel. qPCR-based Method for Evaluating the Efficiency of Seed Coating against Maize Late Wilt Disease.
2. Monif AlRashidi, Dean of Scientific Research, University of Ha'il, Saudi Arabia. Behavioural Mechanisms Adopted by Incubating Seabirds to Cope with Extreme Hot Environments: a Case Study on the Incubation of Lesser Crested Terns *(Thalasseus Bengalensis)*.
3. <u>Ilse Michelle Mancilla-Infante</u>, MSc Student, Universidad Autónoma Chapingo, Mexico, Juan Enrique Rodríguez-Pérez, Research Professor, Universidad Autónoma Chapingo, Mexico, Jaime Sahagún-Castellanos, Research Professor, Universidad Autónoma Chapingo, Mexico & Alejandro F. Barrientos-Priego, Research Professor, Universidad Autónoma Chapingo, Mexico. Interspecific Rootstocks (*Solanum lycopersicum* L. x *Solanum pimpinellifolium*) in Tomato Production.
4. Esra Per, Researcher, Gazi University, Turkey. The Common Bird Composition, Abundance and Distribution in the Developed and Industrialized Provinces of Turkey.
5. Ece Dereagzi, Research Assistant, Istanbul Bilgi University, Turkey. Population Density Estimation of Lyciasalamandra Flavimembris in Paradise Island (Marmaris).

12:30-14:00 Session VII (Room C-10th Floor): Marine Ecology & Water

Chair: Monif AlRashidi, Dean of Scientific Research, University of Ha'il, Saudi Arabia.

1. Chansheng He, Professor and Director, Lanzhou University, China. Watershed Hydrology: Advancement, Opportunities and Challenges.
2. <u>Pedro G. Toledo</u>, Professor, University of Concepcion, Chile & Gonzalo Quezada, PhD Student, University of Concepcion, Chile. Replacing Fresh Water by Seawater in mineral Processing. Effect of Electrolytes on the Viscoelastic Behaviour of Flocculated Silica Suspensions in Concentrated Seawater Salts by Experiments and Molecular Simulations.
3. Emile Didier Fiogbe, Director of Laboratory, University of Abomey-Calavi, Benin. Complete

Replacement of Fish Meal by other Animal Protein Sources on Growth Performance of Clarias gariepinus Fingerlings.

14:00-15:00 Lunch

15:00-16:30 Session VIII (Room B-10th Floor): Special Issues II

Chair: Sinan Ogun, Academic Member, ATINER & Head, RR Research & Development Ltd., Turkey.

1. Dolores Valentina Mariscal-Aguayo, Professor, Universidad Autónoma Chapingo, Mexico, Heriberto Estrella-Quintero, Professor, Universidad Autónoma Chapingo, Mexico & Jose Enrique Salas-Barboza, Independent Consultant, Agropec Star, S.A. de C.V., México. Coffee Value Network Characterization using the Advisory and Consulting Model Chapingo - AGROPEC Star®.
2. Phokele Maponya, Project Manager, Agricultural Research Council, South Africa, Venter SL, Agricultural Research Council, South Africa, Du Plooy CP, Agricultural Research Council, South Africa & Van Den Heever E, Agricultural Research Council, South Africa. The Status of Drought in the Winterveldt Area: A Case of Smallholder Farmers in Tshwane, South Africa.
3. Javier Mauricio Obando Ulloa, Researcher, Costa Rica Institute of Technology, Costa Rica, Mikel Rivero Marcos, Researcher, Universidad Pública de Navarra, Spain, María Fernanda Sanchez-Ramírez, Student, Costa Rica Institute of Technology, Costa Rica, Esteban Martinez-Mora, Student, Costa Rica Institute of Technology, Costa Rica, Guillermo Castro-Badilla, Professor, Costa Rica Institute of Technology, Costa Rica, Freddy Araya-Rodríguez, Professor, Costa Rica Institute of Technology, Costa Rica & Tomas de Jesus Guzman-Hernandez, Professor, Costa Rica Institute of Technology, Costa Rica. Solar Energy as an Alternative Productive Tool in Agricultural Units in Costa Rica.

16:30-16:50 Closing Remarks

Sinan Ogun, Academic Member, ATINER & Head, RR Research & Development Ltd., Turkey.

21:00- 22:30 Dinner

Wednesday 12 July 2017
Educational Island Tour or Mycenae and Epidaurus Visit

Thursday 13 July 2017
Delphi Visit

Jaehwang Ahn
PhD Student, Ajou University, South Korea
Youngje Choi
PhD Student, Ajou Univeristy, South Korea
Eunkyung Lee
PhD Student, Ajou University, South Korea
&
Jaeeung Yi
Professor, Ajou University, South Korea

Analysis of Diversion Tunnel to Supply Water in Severe Drought Situation

Drought is a natural disaster affecting water supply directly. There have been periodically big and small droughts in south Korea. Due to the drought occurring around the central region of Korea from 2014 to 2015, storage rate of multi-purpose reservoirs located in the central region of south Korea diminished to below 50%. In particular, the storage of Boryeong reservoir located in Western Guem river basin had continuously diminished during these 2 years. To solve such a problem, the Ministry of Land, Infrastructure and Transport decided to install Boryeong dam diversion tunnel, an emergency water supply facility connecting the downstream of Geum River's Baekje weir and Bangyo stream, the upper stream of Boryeong dam, in order to supply the Geum River downstream water to the Boryeong reservoir. This study aimed to analyze the operation effect of Boryeong dam diversion tunnel according to the diversion tunnel's operation conditions. To this end, this study simulated operations of the Boryeong dam by applying the measured reservoir inflow data and water supply adjustment standard for 19 years from 1998 to 2016. As a result, the normal operation of the diversion tunnel can meet the basic planned water supply of Boryeong reservoir during the release operation except the initial period. However, the release through a spillway increased about two times, compared to the case not operating the diversion tunnel. In the cases of operating the diversion tunnel only during drought period, the water supply is increased, but there was no big difference in spillway discharge compared to the case of not operating the diversion tunnel.

Monif Al Rashidi
Dean of Scientific Research, University of Ha'il, Saudi Arabia

Behavioural Mechanisms Adopted by Incubating Seabirds to Cope with Extreme Hot Environments: a Case Study on the Incubation of Lesser Crested Terns *(Thalasseus Bengalensis)*

Seabirds (about 346 species) are a diverse group with a worldwide distribution that are adapted to all types of marine environments. Some seabird species breed in the most hostile environments, which range from extreme cold polar zones to extreme hot desert zones. In this study, the Lesser Crested Tern (*Thalasseus bengalensis*) was used as a model species to evaluate how incubating seabirds cope with extremely hot environments and the behavioural mechanisms they adopt to prevent eggs from hyperthermia, since it breeds in nests without any isolation materials, and egg laying is usually during the summer (May - June). This study was carried out on Jana Island, north-eastern Saudi Arabia where the midday ground temperature may exceed 60°C during the summer. To test the above mentioned hypothesis, trail cameras with night vision were used to record the incubation behaviour of adults every minute for at least 24 hours. In addition, the ground surface temperature was measured at one-minute intervals for at least 24 hours using temperature data loggers which were placed on the ground surface in open areas. The results showed that the Lesser Crested Terns attended their eggs continuously during a 24 hour period without leaving the nests, except when a disturbance occurred. This behaviour prevents the eggs from reaching lethal temperatures. Moreover, the incubating adults changed their body orientation in relation to the sun. Most incubating adults faced west in the morning, and began rotating clockwise until they faced east in the evening, which could be a behavioural mechanism that plays a vital role in preventing both incubating adults and eggs from overheating.

Daniel Bucur

Professor, University of Agricultural Sciences and Veterinary Medicine
in Iasi, Romania

Consideration on the Drought Phenomenon in Prut River Basin

Drought is one of the most important factors which affect the exploitation of water resources infrastructure. Regarded as a three-dimensional phenomenon, drought can be characterized by intensity, duration and geographic spread. Dryness and drought can be considered the most complex phenomena, because on their onset take part several factors: rainfall, soil water reserves, moisture and air temperature, evapotranspiration, wind speed, soil type, etc.

Previous research indicates that, in Romania, dry periods succeed without describing a real cyclical character, with the rainy ones at an interval of 12 - 15 years. Massive deforestation made before 1989 to extend agricultural land in the Moldavian Plain, have caused major imbalances: landslides, phreatic drainage and increased frequency of droughts, that's why the climate became hostile.

Placed in south-eastern Europe, Prut River basin is influenced by a rainfall regime with large monthly variations, specific to the temperate - continental climate. Drought occurs in majority of the years, but it is not very pronounced as in the steppe zone from extreme eastern part of the continent.

In Prut River catchment area, Jijia – Bahlui Depression is the most intense geomorphological unit of erosion, where the altitudes range from 150 to 200 m and reception areas of Jijia, Baseu and Bahlui have a parallel disposal and drain the entire area. This study aims to analyze droughts in this region, where the rainfall regime shows monthly and annual large fluctuations. It highlights the impact of drought as a hydroclimatic risk and the implications of its consequences on the local economy.

The most common methods to characterize dryness and drought phenomena are mathematical (indices) and graphical ones. In this study we used the following mathematical methods: Hellmann's criterion, standardized precipitation index (SPI), Topor aridity index.

Statistical analysis integrated data recorded during 1980 - 2014 at the rainfall stations located in the floodplains of Prut River (Oroftiana, Radauti – Prut, Ungheni and Prisacani) and Jijia (right tributary, of the first order - Dangeni, Todireni și Victoria).

The analysis of discrete continuous variables of 35 terms shows that the Prut River watershed is influenced by a rainfall regime with large monthly variations, specific to the temperate - continental climate. The months with precipitations deficit prevail and causes droughts. Statistical analysis of the dryness on the middle floodplain of Prut River emphasizes their accidental character, with a higher frequency in the last 13 years.

Large differences that arise between the two indicators are caused further by the calculation process and less by local variation of climatic elements. Results show that standardized precipitation index has disadvantages in approximate the water deficiency, because does not take into account the temporal distribution of rainfall.

The incidence of droughts in the Moldavian Plain prints a sharp decrease of the runoff and the appearance of drying - up phenomenon in the middle basin of Prut River. It is not long, due to the unstable nature of the rainfall regime. Rivers dried - up with a frequency of 40 - 50 % in basins with the surface between 15 and 20 km² and over 90 % in basins with areas less than 5 km².

Jerome Canei
PhD Student, Université de Mons, Belgium

Sandy Substrates: Morphological Adaptations of *Heteroconger hassi* (Congridae) & *Ammodytes tobianus* (Ammodytidae)

Sandy substrates, marine or terrestrial, cover a large part of our planet. Numerous species, including the vertebrates, have developed adaptations to live in these environments. One group of vertebrates was here investigated, the Teleosts. Among them, two species, *Heteroconger hassi*, the spotted garden eel, and *Ammodytes tobianus*, the lesser sand eel, were studied. Histological and immunocytochemical analyses were performed on those species. The aim of this study was to describe the structural adaptations of the skin according to sand abrasion. The results show differences between the two species; *H. hassi* exhibiting two kinds of secretory cells and possessing microridges at the epidermal level. Moreover, the proliferation of those cells is weak. No distinctive scales were observed. On another side *A. tobianus* exhibits only one type of secretory cell, presents thick scales and has a higher number of epidermal proliferating cells. The other hypothetical morphological adaptations of these two Teleosts species are discussed.

Gad Degani
Professor, MIGAL, Israel

Building a Model Based on the Morphology, Biology, Behaviour and Life Cycle of *T. v. Vittatus A*daptation

The contribution of the present paper is in building a model based on the results collected on the distribution, life cycle, behaviour and genetic variations among different populations in northern Israel down to the central coastal plains and near the desert of this species. More specifically, this model is based on the morphology, biology, behaviour and life cycle of *T. v. vittatus* adaptation. The adaptation to and selection of habitats depends mainly on the terrestrial phase and less on the aquatic phases. There are various breeding places in all of the habitats, however, the newts are mainly used to winter ponds, many of which dry up in summer where the larvae can grow and complete metamorphosis. The adaptation of the breeding ponds is not under ecological conditions during larvae growth and complete metamorphosis, but the time of adult breeding and larvae growth occur year-round. The molecular genetic variation in the different areas support our hypothesis that climate is affected by altitude and proximity to the desert. During the life cycle the newts have two habitats aquatic and terrestrial and the adaption to terrestrial habitats is more affected on the newts distribution than the aquatic habitat. The quality model of fitness *T. v. vittatus* to extreme conditions was suggested.

Ece Dereagzi
Research Assistant, Istanbul Bilgi University, Turkey

Population Density Estimation of Lyciasalamandra Flavimembris in Paradise Island (Marmaris)

Aim: In this study, calculation of population density of Lyciasalamandra flavimembris in Paradise Island (Marmaris), identification of population threatening factors and detection of protection strategies with respect to that are aimed.

Content: Individuals of Lyciasalamandra flavimembris population in Paradise Island (Marmaris) were captured at different days. Coordinates, which are the capture point of individuals, were flagged via Global Positioning System (GPS). Counts of individuals -that were seem for the first time and that were marked before- were used to calculate population density.

Methods: Paradise island is a peninsula that is in Marmaris borders of the city Muğla. The peninsula is 8 kilometers far from the center of the town. Natural marking were used in the existing population of Paradise Peninsula. Photographed individuals were compared with the individuals that were captured in different dates with respect to their cryptic coloring. Firstly seen and marked individuals were detected. Coordinates were recorded the capturing location. These coordinates were flagged in Google Earth and the area was measured. Data was used to calculate population density. Population density was compared with the density of similar species and population status was detected.

Results: Species were seen in two different sites of Paradise Island. The density of the population was detected 4,74- 12,63/ha. Decreasing population trend appeared with respect to the population of Lyciasalamandra luschani in Meis Island, which has density that is 10000/ha.

Kingsley Agbor Etchu
Director, Scientific Coordinator for Animal Production and Fisheries,
Institute of Agricultural Research for Development (IRAD), Cameroon
Julius Enow Tabot
Researcher, Institute of Agricultural Research for Development (IRAD),
Cameroon
Annabella Abongwa Ngengwi
Researcher, Institute of Agricultural Research for Development (IRAD),
Cameroon
&
Olivier Sandra Ghomsi
Head of Poultry Unit
Institute of Agricultural Research for Development (IRAD), Cameroon

Reproductive Performance of Rabbit Does Fed Moringa Oleifera Leaf Meal (Molm) as a Protein Substitute to Soya Bean Meal

A study was conducted with 32 mixed breed rabbits averaging 2.35-3.11kg and aged between 7-8 months to evaluate the reproductive performance of rabbit does fed graded levels of *Moringa oleifera* leaf meal (MOLM) in a 12- week feeding trial. Four treatment diets were compounded whereby MOLM substituted soya bean meal at 0, 25, 50 and 75% respectively. The animals were allotted to the four treatment diets so that each diet had 6 does and 2 bucks housed individually in each cage. Rabbit does were introduce to the bucks for mating in the early morning in the ratio 1:3 (01 male:03 female) per week during the third week of the study. Feed intake and weight gain were recorded, while the gestation length, percentage conception, litter size at birth, litter weight at birth and survival rate of kids were calculated. The results showed no significant difference (P>0.05) in the average weekly weight gain of does, litter size at birth , average litter weight at birth and average survival rate of kids. However, the results revealed a significant difference (P<0.05) in the gestation length and average weekly weight gain of kids. The results suggest that MOLM incorporated in the diets of rabbits up to 75% had no detrimental effect on the reproductive performance of rabbit does.

Emile Didier Fiogbe
Director of Laboratory, University of Abomey-Calavi, Benin

Complete Replacement of Fish Meal by other Animal Protein Sources on Growth Performance of *Clarias gariepinus* Fingerlings

To completely replace the fishmeal by a mixture of earthworm and maggot meals, experimental diets were tested during 42 days on Clarias gariepinus fingerlings. Five isoproteic and isoenergetic diets (40 % crude protein and 17.9 ± 0.3 kJ g-1) including the control diet (D1) based on fishmeal, were formulated.

All these diets satisfied the essential amino acids requirements of C. gariepinus fingerlings. These diets were tested on triplicate groups of 50 fishes (initial body weight: 3 ± 0.1 g) bred in tank (0.5 m3). The approximate ratios 2:5; 1:4; 1:12 and 0:1 between the earthworm meal and the maggot meal were used, respectively, to formulate four diets D2, D3, D4 and D5 without fishmeal. After the feeding period, significant differences $(P \backslash 0.05)$ were observed on growth, feed utilization between control diet (D1) and test diets (D2–D5). Fish fed earthworm- and maggot-based diets were grown better than those fed the control diet. Survival and feed utilization were not significantly affected by the ratio between earthworm meal and maggot meal in the test diets. Lipid content was higher in carcass and fillet of fishes fed earthworm and maggot meals-based diets than that of those fed fish meal-based diet. This study indicates that when the ratio 2:5 between the earthworm meal and the maggot meal is used to entirely replace fish meal and the ratio lysine/arginine of the diet is inferior to 1, the growth performances and feed utilization of Clarias gariepinus fingerlings are improved.

Jixi Gao
Professor, Nanjing Institute of Environmental Sciences, Ministry of
Environmental Protection, China

Construction of Technique System of China's Ecological Protection Redlines

There are too many types of ecological protected areas in China, of which present overlapping phenomenon in space, and are managed by different departments with various policies. Aiming to solve the problems of low efficiency of ecological management caused by lack of unified supervision and management system, in this paper, we first provides a comprehensive analysis of the objective and significance about constructing the technique system of ecological protection redlines from the aspects of safeguarding national ecological security, improving the systems of ecological and environmental protection system, ensuring the supply of ecological products, and enhancing the ability of national sustainable development, etc. Then, we built the technique system of ecological protection redlines system, of which includes key ecological function areas redlines, ecologically sensitive or fragile areas redlines, nature culture and genetic resources protected areas redlines, and other kinds of ecological redlines, etc. Generally speaking, there are four categories including 33 subtypes of ecological redlines. Finally, the methods of building ecological protection redlines system are put forward from the view of determining protected object of ecological redlines, assessment of ecological protection importance and ecological sensitivity, and constructing the technique system of regional ecological protection redlines. The purpose of this paper is to hopefully provide scientific support for the ongoing work of ecological protection redlines delineation and supervision, and also provide a key carrier to redesign China's ecological protection and restoration system, of which would achieve the goal of one redline to control all the important ecological areas in China.

Chansheng He
Professor & Director, Lanzhou University, China

Watershed Hydrology:
Advancement, Opportunities and Challenges

Rapid population growth, fast urbanization, increasing economic expansion, drastic land cover alterations, and climate change have resulted in a global water crisis. Worldwide, approximately 2.6 billion people lack access to safe drinking water supply and improved sanitation, and water-associated diseases cause serious illness of over 300 million people each year, and by 2025 over 3.5 billion people will have water shortages. The World Economic Forum defines water supply crisis as one of the top 5 crises facing the globe in the next 10 years.

To address this pressing challenge, researchers have called for the development of a predictive science of earth surface dynamics by taking advantage of the advances in tracing, mapping, remote sensing, and modeling technologies over the past few decades to reliably understand, model, and predict the interwoven physical, biological, geochemical, and human dynamics that collectively shape the Earth's surface. This paper reviews recent advances in watershed hydrological research, particularly applications of remote sending, GIS, and simulation models in estimating rainfall and snowmelt, evapotranspiration, soil moisture, groundwater, discharge and storage at the watershed scale. Subsequently, the paper discusses opportunities and challenges in watershed hydrological research and suggests that 1) long term, detailed spatial coverage, high quality in-situ observation data need to be collected and assimilated with current regional and local datasets to advance watershed hydrological modeling; and 2) regional/watershed hydrology and water resource models need to be developed to integrate components of climate, economy, ecology, and water consumptions through international collaborations to support water resource policy/decision making at the regional/watershed scale.

Jonas Jatkauskas
Senior Scientist, Lithuanian University of Health Sciences, Lithuania
&
Vilma Vrotniakiene
Senior Scientist, Lithuanian University of Health Sciences, Lithuania

Using Various Lactic Acid Bacteria Inoculants during Ensiling Different Forages towards Fermentation, Nutritive Value and Aerobic Deterioration

Silage production is growing in importance worldwide as the demand of feeds for the milk and beef production increases, as well as, increases the importance of food safety, which depends on the hygienic quality of forages consumed by animals. Researches and farmers emphasized the importance of the efficient forage conservation technologies that minimize nutrient losses during harvesting, fermentation, storage and aerobic deterioration during feeding out, and improve hygienic quality (safety) of conserved feeds. There have been major advances in the science and practice of silage making in the world over the last 45 years. First of all, silage research has focused on the production and ensiling of grass and legume silages with reference to reduction of dry matter losses and improving fermentation. Later on, researches have dealt with the ensiling and use of silages from a wide range of crops including whole crop maize, whole crop cereal, tropical forages and by-products. Moreover, research on silages included studies concerned with aerobic stability, microbial environment, hygiene, silage dry matter intake by animal, animal production, including the effect on animal products, hygiene and safety for humans, and silages technology impact on the environment (Wilkins and Wilkinson, 2015).

The objectives of the reviewed studies were to assess lactic acid bacteria inoculants potential to improve fermentation pattern of the grass, legume and maize silage and to change microbial population profile, and whether the inoculants have an effect on the extent of deterioration occurring during the exposure to air aerobic stability in laboratory scale and large scale experiments.

Jungwon Ji
Researcher, Ajou University, South Korea
Eunkyung Lee
PhD Student, Ajou University, South Korea
Youngje Choi
PhD Student, Ajou Univeristy, South Korea
Heechan Chae
Graduate Student, Ajou University, South Korea
&
Jaeeung Yi
Professor, Ajou University, South Korea

Flood Forecasting for Hydropower Reservoirs Using Neuro-Fuzzy Technique in North Han River

In South Korea, About 60 to 70 percent of rainfall occurs during the rainy season (June to September) under the influence of monsoon. Due to these climates, there was a high risk of floods in summer and frequent drought damage during the dry season. So Korean government has constructed and operated many hydraulic structures. The North Han River is located in the upper reaches of the Han River, which flows into Seoul, the capital city of South Korea. There are five hydropower reservoirs in the North Han River, four of which have no flood control capacity. These reservoirs aim to maintain constant water level in order to improve power generation efficiency and prevent the overflow of the reservoir. However, in recent years, it has been difficult to achieve these goals due to the torrential rains and the guerrilla rainstorm. Until now, there have been many studies on the forecasting of inflows for the reservoirs operation, but the forecasted inflow time interval was more than 1 hour. This time interval is too long to be used for operation of reservoirs in flood time. Also, the reservoirs water level in North Han River changes drastically even during short periods of time in flood season. In this study, in order to operate the hydropower reservoirs effectively, the inflow was forecasted with 10-minute intervals. The model was constructed considering the characteristics of the watersheds in which the reservoirs are located in series. The neuro-fuzzy method is used in this study and the model is constructed using the rainfall events from 2004 to 2016.

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Effect of Different Sources and Levels of Zinc on some Tissues Mineral Concentration in Laying Hens

This study was conducted to evaluate the efficiency of dietary zinc sources and levels on some tissues mineral content and bone characteristics in laying hens. Twenty-four weeks old, 270 H&N Super Nick laying hens were allocated to 15 experimental groups in a 3 (zinc sources) x 5 (levels) factorial arrangement. Three zinc sources including zinc oxide as inorganic forms, zinc-proteinate as organic form and nano zinc-oxide powder as nano form at different levels (20, 40, 60, 80 and 100 mg/kg diet) were tested.

The results of study indicated that liver Zn content was significantly higher in the nano-Zn group than that in the inorganic-ZnO and organic-Zn groups ($P < 0.05$). Eggshell Mg and P contents were significantly lower in the nano-Zn group compare to and organic-Zn and inorganic-Zn groups ($P < 0.01$; $P < 0.05$). Eggshell Ca content was lower in the nano-Zn group than that in the organic-Zn group. Excreta Zn content increased with the dietary zinc levels. Tibia Zn content, tibia weight, tibia stress and breaking strength were no significantly affected by the dietary Zn sources and levels.

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The Status of Drought in the Winterveldt Area: A Case of Smallholder Farmers in Tshwane, South Africa

South Africa is considered a semi – arid country vulnerable to water stress, particularly drought. In the previous 12 months, South Africa has experienced one of the worst drought in history where some provinces were declared disaster areas.During the last decade the frequency of natural disasters in the farming community in Winterveldt area increased significantly and the most common disaster was drought. The aim of the study was to identify sustainable solutions towards drought adaptation in Winterveldt area. The following objectives were identified: (a) To describe socio – economic characteristics of smallholder farmers in Winterveldt area (b) To describe the extend of drought impact on agricultural production in Winterveldt area. A representative sample of 31 productive farms participated in the study and they all fall under City of Tshwane Metropolitan. The purposive sampling method was used to select productive farms and to cover the uniform or homogeneous characteristics of farms. The sample frame was designed to meet the objectives of the study and to adhere to the statistical specifications for accuracy and representation. The questionnaire was administrated to respondents. The study also used observations, current and past rainfall distribution maps as part of data collection. Data was coded, captured, and analysed using SPSS. Descriptive and regressions analyses was conducted. The results showed a bleak picture on drought impact in Winterveldt area where agricultural production has decreased significantly.

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Coffee Value Network Characterization using the Advisory and Consulting Model Chapingo - AGROPEC Star®

Mexico is a major producer of coffee, however, the characteristics of its production systems are not well known. The objective of this work was to characterize the coffee value network using the Chapingo - Agropec Star advisory and consulting model in Puebla and Veracruz. The model was implemented, which includes a digital platform with specialized software and a comprehensive management advising and consulting process, with the participation of 20 advisors who assisted 419 agribusinesses, distributed in 463.13 hectares. The activities carried out were: software installation on the advisors' computers, training and virtual consultation for advisors, follow-up on the management of the platform and compilation of the databases for the monitoring of agribusiness indicators during a period of nine months. The activities carried out by the producers were pruning (73.03 %), regulation of shade for the crop (67.13 %), as well as weed control (81.46 %) and manual harvesting (56.18 %). 5.6 % of the producers have production records, with an average production of 398.8 kg. The average size of the farms is 0.96 ha. 98 % of the producers are indigenous with a high poverty level, use varieties without improvement, old plantations without sanitary control, poor crop management, low yields, inadequate advice and market fluctuation. Shade management, crop pruning, use of live barriers, increased plant density, integrated weed management, pests and diseases through biological control, fertilization rates based on soil and plant analysis, use of improved varieties, the renewal of coffee plantations, the promoting of the transition to organic coffee, technical advice scheme and use of software were suggested. Moreover, the producer was encouraged to improve its organization systems in order to generate economies of scale.

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High Throughput Plant Phenotyping: A New Window to Natural Resources Management and Agricultural Research

High throughput plant phenotyping is increasingly being used to assess morphological and biophysical traits of economically important crops in agriculture, under controlled environment or in the field. In this study, we assess the potential application of this technique in natural resources management, namely the characterization of woody plants regeneration, establishment and growth, under water stress and nutrient manipulations. This is important in our efforts to better understand the impacts of climate variability and change combined with anthropogenic management on forest ecosystems.

Three woody species were selected for this study, *Quercus prinoides*, *Quercus bicolor* and *Betula papyrifera*. Seeds from these species were collected from trees growing at the edge of their natural distribution in Nebraska, Missouri and Iowa, USA. Seeds were germinated in the greenhouse and were transferred to the Lemnatec[3D] High Throughput Plant Phenotyping Facility at the University of Nebraska-Lincoln. Seedlings subjected to water and nutrient manipulations were imaged using four cameras (Visible, Fluorescence, Infra-Red and Hyperspectral), throughout the growing season. Traditional leaf to plant levels ecophysiological measurements were concurrently acquired to assess the relationship between these two techniques. These include gas exchange (LI 6400 and LI 6800, LICOR Inc., Lincoln NE), chlorophyll content, optical characteristics (Ocean Optics USB200), water and osmotic potentials, leaf area and weight, plant nutrients and carbon isotope ratio.

In this presentation, we highlight results on the potential application of high throughput phenotyping techniques for the three species, characterized with different growth habits and plant architecture, their responses to water and nutrient manipulations, and the relationship between imaging and traditional ecophysiological techniques.

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The Common Bird Composition, Abundance and Distribution in the Developed and Industrialized Provinces of Turkey

Turkey is an industrializing and developing country. 71% of industrial activities occur in twelve cities. These cities; Istanbul, Bursa, Ankara, Izmir, Konya, Gaziantep, Denizli, Kocaeli, Adana, Tekirdag, Kayseri and Mersin. The main aim of this study is to determine the composition, abundance and dominance of common species in the twelve cities which play a significant role in industrialization in Turkey. The observation records of the species between 1946 and 2017 were compiled from KusBank database, personal notes and from published materials (thesis, article, book, report, trip reports and web pages). The most common bird species in twelve cities; *Passer domesticus* (the house sparrow), *Pica pica* (the eurasian magpie), *Corvus cornix* (the hooded crow), *Parus major* (the great tit), *Larus michahellis* (the yellow-legged gull), *Fringilla coelebs* (the common chaffinch), *Turdus merula* (the blackbird), *Fulica atra* (the eurasian coot), *Hirundo rustica* (the barn swallow) and *Corvus monedula* (the western jackdaw). Regional differences have been detected in the composition, abundance and distribution of common species. *Pycnonotus xanthopygos* (the white-spectacled bulbul) in Adana and Mersin; *Streptopelia decaocto* (the eurasian collared dove), *Carduelis carduelis* (the european goldfinch) and *Galerida cristata* (the crested lark) in Adana, Bursa, Denizli, Gaziantep, İzmir, and Mersin; *Phalacrocorax carbo* (the great cormorant) in İstanbul, İzmir and Kocaeli; *Columba livia* (the rock dove) in Kayseri and Ankara are dominant. The species composition of provinces has changed with the years. Especially the distribution area and dominance of *Pica pica* (the eurasian magpie) has increased. In the future, there will be new changes in the composition, distribution and dominance of common species with the continuing increase of industrialization and urbanization.

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Cloud-based Animal Health Service Provision

The presentation will describe the technology elements developed to create a platform for animal health monitoring and the subsequent dissemination of the health information of individual animals to increase the efficiency of on-farm operations and inform the supply chain. The technology measures the energy profile and the amount of time a dairy cow has spent eating and ruminating, both crucial metrics to determine individual animal's welfare. The information is presented through a cloud environment to relevant stakeholders across the value chain.

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Replacing Fresh Water by Seawater in mineral Processing. Effect of Electrolytes on the Viscoelastic Behaviour of Flocculated Silica Suspensions in Concentrated Seawater Salts by Experiments and Molecular Simulations

The silica-water interface is central to the processing of a large number of mineral systems and the flow properties of particulate suspensions. In particular, these flow properties define the upper limit to tailing processing in the mining industry and, ultimately, the recovery of water. In some regions of the world, the scarcity of fresh water has pushed this industry to use seawater, either as is or partially desalinated. Here we analyze the impact of monovalent alkali metal and divalent alkaline-earth metal chlorides that are typical of seawater on the viscoelastic behavior of flocculated silica sediments at concentrations typical of thickening systems. The sediment samples were subject to creep-recovery tests. All sediments exhibit nonlinear viscoelastic behavior, deduced from the compliance-applied stress relationship. Interestingly, creep recovery was observed to be related to the Hofmeister series, $Cs^+ < K^+ < Na^+ < Li^+$, with Cs^+ producing lower recoveries than Li^+, and $Ca^{2+} < Mg^{2+}$, with Ca^{2+} producing lower recoveries than Mg^{2+}. For the range of loads below yielding, the apparent compliance follows the inverse Hofmeister series, i.e., the compliance increases according to the series $Cs^+ > K^+ > Na^+ > Li^+$ and $Ca^{2+} > Mg^{2+}$. Sediments in the presence of maker salts are clearly less deformable (lower apparent compliance) than in the presence of breaker salts explaining the higher recoveries in the former salts. The yield stress, critical strain, and critical strain energy of the sediments were observed to be higher in maker salts (Na^+) compared with breaker salts (Cs^+ and K^+), due to stronger bonds in the particle networks.

Comparing the viscoelastic behavior of maker cations it is observed that critical strain and critical strain energy of the sediments unexpectedly follow the order $Li^+ < Na^+$ and $Mg^{2+} < Ca^{2+}$. The explanation rests on the strong hydration of Li and Mg which prevents closer approach of these cations to the silica surfaces. Our model of viscoelastic behavior [Goñi et al., Colloid Surface A 482 (2015) 500] satisfactorily reproduces all experimental strain-time curves. To

unraveled the interactions and mechanisms operating at the quartz-water interface we used molecular simulation. We study the quartz-water interface in the presence of seawater salts, monovalent and divalent, and flocculant via molecular dynamics and a robust force field, particularly we study the adsorption of nine seawater salts on a quartz surface properly deprotonated. The present work provides novel input to decisions about the use of seawater or partially desalinated seawater in minerals processing with direct implications for tailings transportation, handling and water recovery.

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Spatial Heterogeneity in the Food Web of a Large Shallow Eutrophic Lake (Lake Taihu, China): Implications for Eutrophication Process and Management

Understanding food web spatial heterogeneity is important for ecologists and lake managers to understand ecosystem complexity and lake management. Lake Taihu, a large shallow eutrophic lake in China, has two distinct zones: algae- and macrophyte-dominated zones. In this study, we assessed the spatial heterogeneity of food webs in the two lake zones through stable isotope analysis and mixing isotope model. Overall, more δ^{13}C-depleted and δ^{15}N-enriched ratios were found in the algae- than the macrophyte-dominated zone for basal sources and consumers. The basal sources and consumers showed significant differences for δ^{13}C and δ^{15}N ratios between the two lake zones, except for the filter-feeding fishes. These spatial differences may have resulted from catchment anthropogenic impacts and ecological interactions within the system. Spatial trophic heterogeneity may be considered for protection and restoration of the shallow eutrophic lake.