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2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

VIRTUAL EVENT

SEPT 01-03

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# BOOK OF ABSTRACTS

## 2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

## 01-03 SEPT

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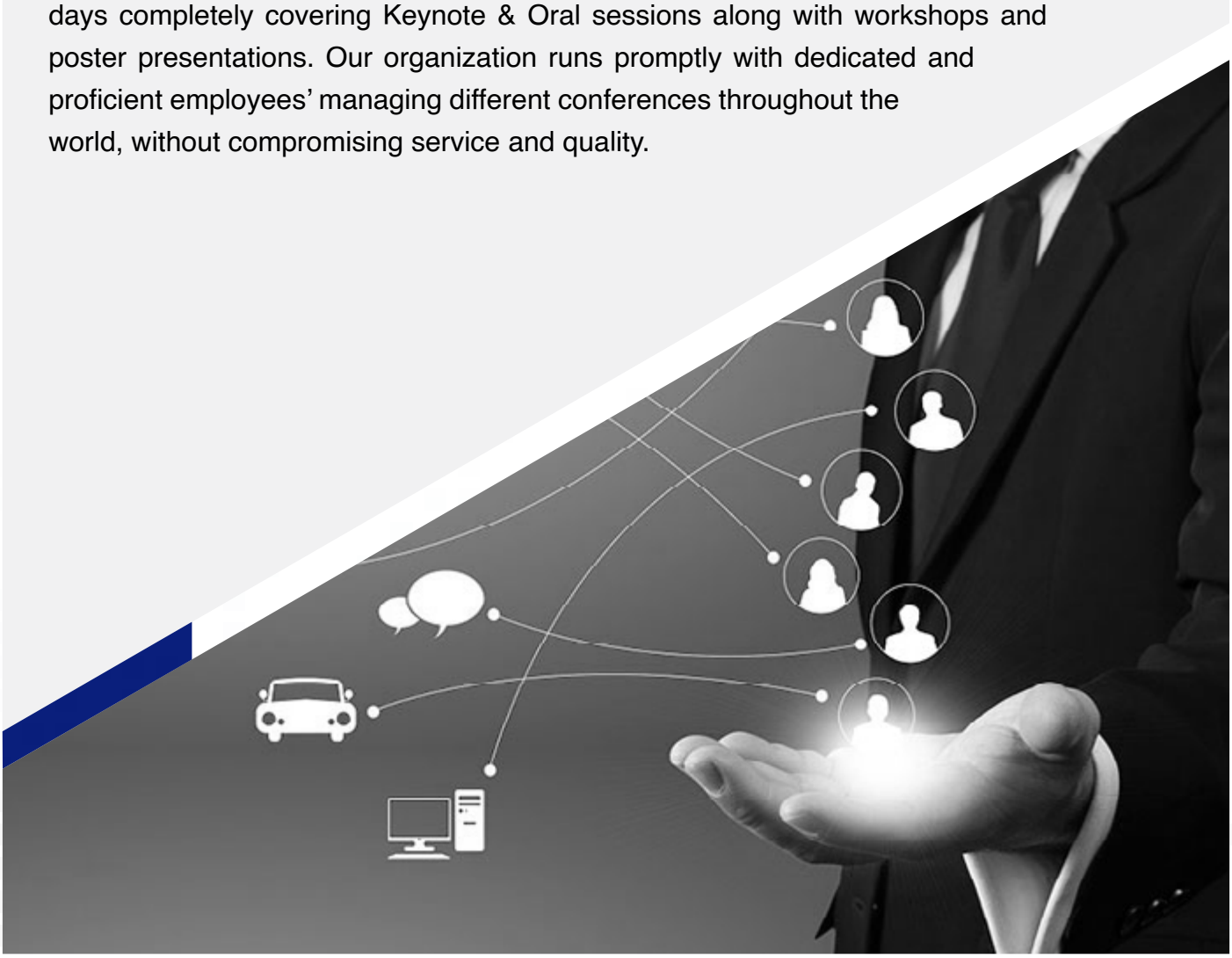
# ABOUT MAGNUS GROUP

**Magnus Group (MG)** is initiated to meet a need and to pursue collective goals of the scientific community specifically focusing in the field of Sciences, Engineering and technology to endorse exchanging of the ideas & knowledge which facilitate the collaboration between the scientists, academicians and researchers of same field or interdisciplinary research. Magnus group is proficient in organizing conferences, meetings, seminars and workshops with the ingenious and peerless speakers throughout the world providing you and your organization with broad range of networking opportunities to globalize your research and create your own identity. Our conference and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

Participation from 90 different countries and 1090 different Universities have contributed to the success of our conferences. Our first International Conference was organized on Oncology and Radiology (ICOR) in Dubai, UAE. Our conferences usually run for 2-3 days completely covering Keynote & Oral sessions along with workshops and poster presentations. Our organization runs promptly with dedicated and proficient employees' managing different conferences throughout the world, without compromising service and quality.



# ABOUT AGRI 2022

Magnus Group welcomes you to our Online Event entitled “2nd Edition Global Conference on Agriculture and Horticulture” AGRI 2022 scheduled on September 01-03, 2022. with the theme “Rethinking Paradigm Shift in Agriculture and Initiatives to Enhance Food Security”

AGRI 2022 is an international platform that amalgamates world renowned experts of both academics and industries within the discipline of Agriculture and Horticulture from all over of the world. This event brings together all the agricultural scientists and horticulturists to exchange and innovates new theories and practices of Agriculture and Horticulture

# KEYNOTE FORUM

## DAY 01

2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

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**Linas Balciauskas[1]*, Vitalijus Stirke[1], Raminta Skipityte[2], Andrius Garbaras[2], Zilvinas Ezerinskis[2], Laima Balciauskiene[1]**

[1]Nature Research Centre, Akademijos 2, 08412 Vilnius, Lithuania

[2]Center for Physical Sciences and Technology, Saulėtekio av. 3, 02300 Vilnius, Lithuania



# Small mammal ecology in commercial orchards and berry plantations: case study in Lithuania

We studied small mammal ecology (numbers, diversity, reproduction, body condition, differences in the trophic niches and concentrations of various elements in their bodies) in commercial orchards and berry plantations, these being important parts of agricultural ecosystems in Lithuania (northern Europe). In 2018–2020 at 18 sites across the country, we registered 11 species of rodents and insectivores. We conclude that commercial orchards are dominated by common vole (Microtus arvalis), yellow-necked mouse (Apodemus flavicollis) and striped field mouse (A. agrarius) in similar proportions, ca 30% each. Analysis of carbon and nitrogen stable isotope ratios in the hair samples show three granivore species being fully separated according to δ15N values, thus presuming different amounts of food of animal origin in their diet. Separation according to δ13C was not expressed, and intra-specific differences of the isotopic niche were not present. We found trophic niches of three syntopic Microtus vole species being stable throughout the vegetation season, with the widest one being a characteristic of the dominant common vole. These results give new insights into the trophic ecology small herbivores, showing the impact of species co-occurrence. Analyzing 21 elemental concentrations in rodents we found the main sources of variability in elemental concentration were animal species and age, crop and intensity of agricultural practices. Higher concentrations of Cu, Mn, Bi, Co, Cr, Fe, Ni, Sr and Pb in the muscle and bones of the dominant species of rodents from the crop areas in comparison to those in control habitats confirmed that fertilization and the use of pesticides could induce differences in accumulated elemental concentrations. Results also show that commercial orchards are cleaner than industrially heavily polluted sites. Analysing parameters of the community and species we found that the number of species inhabiting orchards was quite stable throughout the vegetation season. Species richness, diversity and relative abundance were not dependent on crop type, yet abundance and diversity decreased in the most intensive agricultural practices (Shannon's H=1.359, compared to H=1.551–1.521 under practices of low and medium intensity) and increased in old crops (H=1.605 vs H=1.051–1.213 in young and medium-aged crops). Small mammal diversity in apple orchards (H=1.604) exceeded their diversities in forests within the country (H=0.55–1.64) and was significantly higher than in crop fields (H=0.53–1.40). Body condition in most species decreased in autumn, with the exception of A. agrarius. Breeding disturbances were recorded in all of the most numerous species, accounting for 14.3–43.9% of all observed pregnancies in commercial orchards. We conclude that old orchards with low intensities of agricultural practices are important territories, maintaining sustainable populations and diversity of small mammals in the agrolandscape.

**Biography**

Prof. Linas Balčiauskas received his PhD in zoology/biology from .Severtsov Institute of Evolutionary Animal Morphology and Ethology in Moscow, 1988, and Dr Hab in biology from Kaunas Vytauto Didžiojo University in Lithuania, 2008. Currently working as leading researcher Head of the Laboratory of Mammalian Ecology in Nature Research Centre, Lithuania. Research experience: hoofed, semi-aquatic, carnivore and small mammal ecology, threatened species, large carnivores, spatial distribution, habitat analysis, population management and computer modeling; biodiversity and ecological diversity, road ecology, human dimensions of mammals. Published more than 75 research papers in SCI/SCIE journals, and over 200 times presented at national and international conferences


## Vasudeva Singh

Former Professor, Dept. of Bio-Engg and Technology, Food Science Division, Gauhati University, Gauati, Assam 781 014, India


# Grain processing in general and Rice Technology in specific

Production of cereals in World is around 2600 million tonnes (MT) and India produces around 280 MT as on 2018-19. 750 MT of paddy rice is produced in World and India produces around 160 MT. From this, ~10% (16 MT) goes for the production of rice products like rice flakes, expanded rice and popped rice which are generally prepared or manufactured in small scale industries. Around 75 MT produced is used for production of raw rice and balance ( 75 MT) is used for the production of parboiled rice. World rice have been classified into 8 groups based on some of their physico-chemical properties like amylose content, gelatinization temp., alkali score, pasting behavior or viscographic parameters, cooking behavior etc. Importance of brown rice along with manufacturing large scale brown rice as well as nutri rice will be highlighted. Importance of Tiny rice mill will also be informed. Parboiling, a method of improving the technological and nutritive values of rice will also be highlighted. Medicinal rice Njawara, a pigmented variety, having high nutrients compared to other normal pigmented and non-pigmented rice varieties, its various physicochemical properties, protein and lipid profile in comparison with non-medicinal rice will be touched upon. Preparation of pre-gelatinized starches will be informed. Usage of cereals, millets, legumes in the preparation of multi grain ready to cook (RTC) and ready to eat (RTE) products will also be touched upon. Making of dhal from whole pulses and their technologies which are generally followed all over the world in some parts of Asia will also be focused upon. Millet technology in brief, maize grits manufacture and products from maize, in addition manufacture of starch from tapioca, which is generally used for the manufacture of Sago will also be touched upon. If time permits weaning foods preparation will also be touched upon.

**Audience Take Away:**

- This lecture will certainly throw light on earning their bread even at house hold level
- In addition to how they can process tapioca roots in order to get sago at house hold level will be learnt by the public
- How to consume brown rice or partially milled brown rice after simple treatment at home, such that it can be used even after 3 months storage at room temperature, as by simple treatment, its lipase activity will be reduced, hence rancidity will be minimized i.e formation of FFA will be reduced, hence it can be used even after few months

**Biography**

After retiring from CSIR-CFTRI as Chief Scientist during 2013, worked as an Emeritus Medical Scientist (ICMR) at University of Mysore and served as a Professor, under DBT sponsored Food Science Project, Gauhati University, Gauhati, Assam till April, 2021. Published 85 research papers, inventor of several processes, one Patent was commercialized to 30 industries. Handled several National & International projects. Guided 70 -80 B.Tech, M.Tech, M.Sc Food Technology, Food Science students for their Dissertation and Investigation problems and produced 8 Ph.D candidates, including an INSA Fellow; African UNU Fellows. Faculty member and Course Co-ordinator of M.Sc Food Technology, HRD courses of CFTRI. Recipient of several awards, delivered several invited lectures, innumerable oral lectures, and presented 70-80 posters at National & International level. Serving Food Safety Standards Authority of India, New Delhi, at different capacities. Also served as a member of Research Advisory Committee, ICAR-Central Institute of Post Harvest Engg and Technology, Ludhiana, Punjab. LifeTime Achievement Awardee from the ACCTI, Dehradun, India.

**Valasia Iakovoglou* and Nikolaos Tsakiris**

UNESCO chair Con-E-Ect, Drama, Greece



# Enhancing restoration while saving water

The summer of 2022 has been characterized as one of the most arid periods that induced problems related to water availability. The lack of water negatively affected the restoration efforts of ecosystems as well as the production in general. Particularly for the Mediterranean semi-arid regions, high frequency and intensity of drought events pose many obstacles to the regeneration and restoration efforts. Nonetheless, research has indicated that seedlings that undergo a period of water stress prior to transplant, have a greater percent of survival success. The aim of this study was to investigate the responses of forest species that were subjected to water deficit conditions prior transplanting. Based on the results, seedlings that were treated with reduced water, were able to successfully survive and maintain growth vigor. Consequently, by preconditioning seedlings for water-deficit conditions the benefit is dual; both saving water with the reduced irrigation frequencies and increasing the seedling survival under harsh arid growth conditions

**Audience Take Away:**

- Tool to increasing restoration success
- Ways to resolve water-related problems under the challenges of climate change
- Understand the impact of species

**Biography**

Dr. Valasia Iakovoglou is a distinct graduate of Iowa State University with more than 20-yrs of national/international research and teaching experience as an Ecophysiologist/Silviculture expert in seedling production and Restoration/Conservation of Ecosystems with emphasis on Biodiversity under the challenges of Climate Change. She has received numerous scholarships, awards and recognitions. She is an editor and reviewer in more than twenty peer-revied Journals with one of them being the Intergovernmental Panel on Climate Change (IPCC). She has more than 100 publications (such as books/book chapters and peer-reviewed scientific papers). She is active in many scientific societies such as the Mediterranean Experts of Climate and environmental Change (MedECC) and associations such as the "Association of Inter-Balkan Woman's Cooperation Societies (AIWCS)" of UNESCO Center, where she is the Secretary General Board Member. Since 2018 she is the Director of the Ecotourism Sector of the UNESCO chair Con-E-Ect

**Dachang Zhang[1]*, Thomas Dax[2]**

[1]Water & Eco Crisis Foundation, San Jose, California 95129, USA

[2]Federal Institute of Agricultural Economics, Rural and Mountain Research, 1030 Vienna, Austria



# Suitaiology — Water resource creation from fog in mountains

For a long time, human have been plagued by droughts and floods. Facing disasters, traditional measures for flood or drought often fail. It highlights the major shortcomings of traditional understanding of water resources and the deficiency of the existing water science to adapt climate changes. Suitaiology is a new branch of water science for creation of water resources and optimization of water management to meet the challenges of climate change. Applied in the field of agriculture, it can help achieve sustainable agricultural development and food security. While the mainstream traditionally deals with flooding, drought, erosion, water resources, eco-systems and agriculture, respectively, suitaiology treats them all together in a comprehensive system of nature environment, water and human (NEWH) and studies the interrelationship and interaction amount these internal members. The NEWH system in mountains is much more complicated than in other sites of a water basin. Water, plays an active important role in the system. It can be angel-like, breeding life, nurturing life and bringing vitality to the earth, provide protection for the survival and development of humanity. However, it can also be devil-like, eroding the soil, destroying the existing landscapes, resulting in mudflow, inducing landslides, and producing flood downstream. Since a mountain area is usually the recharge area of water resources in the basin, if the mountain traps water insufficient, it is easy to suffer serious drought in the whole basin. Suitaiology abandons the traditional case-by-case treatment method, but studies the situation of water in various forms (such as fog, snow/ice, raindrops and runoff). So called water situation is the tendency of water action towards a specific feature or behavior type in a given space, moment, action goal and the characteristics of water itself. From the perspective higher than the overall system, suitaiology finds, identifies, understands, analyzes, responds and disposes the possible safety hazards of a healthy NEWH system. It aims to completely eliminate the potential disasters of debris flow, landslide and waterlogging as far as possible, fully create water resources, ensure a good eco-environment and the sustainable development of forestry, agriculture and livestock farming in mountainous areas, and alleviate or even avoid floods and droughts in the whole basin. This lecture focuses on the fog situation in mountains and the creation of water resource by fog collection.

**Biography**

Dr. Dachang Zhang received the B.S. and M.S. degrees in hydrogeology & Engineering Geology from the Changchun Institute of Geology and Chinese Academy of Sciences in 1982 and 1985 respectively, then became a researcher at Chinese Academy of Sciences. After his PhD degree in geography from the University of Vienna in 1996 with significant contributions to a national water project of Austria, he was a postdoctoral fellowship and researcher at the University of Waterloo, Canada from 1997-2000. And then, he worked as a consultant in Canada and U.S.A. and become a License Professional Geologist of the State of California in 2007. He also worked for the University of Bijie, China, as a Professor and the Deputy Dean of the Academy for Bijie Experimental Region for water management and rural development in impoverished mountainous areas from 2008 to 2014. He is the Founder and President of the Water & Eco Crisis Foundation, USA, since 2010. In 2012, Dr. Dachang Zhang and his team set out to create a new water science—Suitaiology, which was first released at the 1st Edition of Global Conference on Agriculture and Horticulture (AGRI 2021) in 2021.

# SPEAKERS

## DAY 01

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## 01-03 SEPT

**Sumudu Senanayake*, Biswajeet Pradhan**

The Centre for Advanced Modelling and Geospatial Information Systems (CAMGIS), School of Civil and Environmental Engineering, Faculty of Engineering and IT, University of Technology Sydney, Sydney, 2007 NSW, Australia

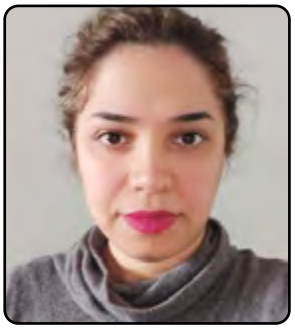


## Soil erosion monitoring in support of achieving SDGs

The human-induced climate change and land-use change are threatening the health of soil ecosystems. A healthy soil ecosystem improves the agricultural productivity in the farming lands. The soil erosion and soil erosion hazards are influenced by factors such as rainfall, wind and land-use change in many parts of the world. This study aims to monitor the soil erosion at farmlands using different tools and techniques: index-based methods, statistical tools, and machine learning algorithms to detect and quantify the soil erosion to improve land productivity to ensure food security achieving sustainable development goals (SDGs). Extreme rainfall patterns and land-use change were observed and predicted to monitor soil erosion and prevent soil erosion hazards concerning sustainable land management for agriculture production. Many researchers identified developing nations in tropical and subtropical regions are highly vulnerable and noticeably victims of climate hazards. One of the tropical climate hazards vulnerable areas, the Central Highlands of Sri Lanka, was selected for this study. The soil erosion was monitored by vegetation indices, economic and ecological indices, empirical models like revised universal soil loss equation (RUSLE), Machine learning approaches as such Artificial neural networks (ANN), Support vector machine (SVM), Adaptive network-based fuzzy inference system (ANFIS) and deep learning methods like long short-term memory neural network model (LSTM) combined with RUSLE. Results were used to identify the most vulnerable farming areas in Low country Wet Zone (WL1a) and Mid country Wet zone (WM1b). Secondly, identified climate influence is much greater than the human-influenced land-use change. Thirdly, soil erosion rates and vulnerability predictions indicate that the most vulnerable farming areas will be more vulnerable if proper mitigation measures, resilience building activities and policy-level decisions are not introduced. The soil-related indicators help to support measuring the achievement related to the SDGs: 2-zero hunger, 3-good health and well-being, 6- clean water and sanitation, 13- climate action, 15 - life on land and 17- partnership which are directly connected with the soil related activities. Minimizing soil erosion would be a solution for reducing the nutrient depletion in farmlands, reducing polluting water bodies, and restoring land degradation, which helps sustain the soil ecosystem in achieving the SDGs

**Biography**

Sumudu Senanayake is a spatial data scientist in the Centre for Advanced Modelling and Geospatial Information Systems (CAMGIS), Faculty of Engineering and IT, University of Technology Sydney, Australia, and the Natural Resources Management Center, Department of Agriculture, Sri Lanka. She has MSc in Bio-systems Engineering, and PhD in Information Systems, Software Engineering, and Analytics from the University of Technology Sydney on "Modelling soil erosion hazards and crop diversity changes due to climate variation in farming systems using Geo-informatics". Her research interests focus on Natural resources management and Sustainable food security against climate variation using geo-informatics techniques and machine learning techniques. She has presented remarkable research work in High-quality scientific journals. She was awarded the Promising Scientist in the Department of Agriculture. Her knowledge and efforts were utilized to succeed in many research projects



## Sarvin Elahi

University of Technology Sydney, 15 Broadway, Ultimo, Sydney, Australia



# Agricultural Technology:Applications of Artificial Intelligence and Digital Twins in Vertical Farming (Controlled Environment Agriculture)

FAO announced that due to the COVID-19 pandemic, about 800 million people lacked access to adequate food in 2020. More than half the people living in urban areas mostly rely on buying agricultural products rather than producing food locally. Spatial limitation of the land and climate stress are the primary agricultural development challenges in urban areas. Vertical farming based on controlled-environment agriculture is a promising approach to promoting sustainable local food production and enhancing food security for the growing population in urban areas. With the rapid advancement of digital technology, leveraging Artificial Intelligence and Machine Learning in agriculture has received much attention. Artificial Intelligence based on the simulation of human intelligence and having access to databases such as Satellite Maps, Satellite Imagery, Geospatial Database, and Geographic Information System Data has improved digital farm management by its accuracy and high efficiency and flexibility, and cost-effectiveness. The literature review indicated that little research is available detailing how Artificial Intelligence can be leveraged across vertical farming to boost food security. Through applying the analytical approach, this research investigates the role of Artificial Intelligence in Vertical Farming development. The innovation of this research is the application of coupled Artificial Intelligence-Vertical Farming approach in Controlled Environment Agriculture, which can manage the environment, inputs, processes, and infrastructure as the major elements of the food systems. This research illustrates how Digital Twins' application can help monitor and control agricultural processes and product qualities and adjustments in vertical farming to deliver food security.

**Biography**

Sarvin Elahi is a Ph.D. student in the field of ecological resilience and urban ecological regeneration at the faculty of Architecture. She received her master's degree in Landscape Architecture with GPA 4 out of 4 from the University of Tehran. Sarvin has a strong background in the fields of Ecological Sustainability, Ecological Regeneration, and Artificial Intelligence. She has more than ten years of professional work experience as a Lead and Principal Investigator (PI) at the Design and Built Environment Department of Sahar Corporate. Besides, she worked as a Teaching Assistant of the course Nature, Human, and Environment at the Department of Landscape Architecture, University of Tehran. She has been collaborating with the NAZAR Research Centre. As a female engineer with strong academic and professional experience in the field of ecological resilience and bushfire, being effective in creating sustainable and enriched communities is her ultimate goal

**Gun Mardiatmokoa**

Forestry Department, Faculty of Agriculture, Pattimura University, Ambon 97233, Indonesia

## Characteristics of soil under sago stand and carbon content in Ambon small island for climate change handling

Sago (Metroxylon spp) is a source of food from wetlands. This plant plays a role in storing water and carbon which is very useful in dealing with climate change. If this plant is widely converted for other uses, such as agricultural expansion, it will cause disturbances in its function as a water and carbon store. In terms of national development in the short term, it is certainly more profitable to expand rice fields. However, in terms of regional development for the long term it is not necessarily profitable because it can trigger climate change that is getting worse. The results showed that the soil characteristics of the research site were Gleisol hydric (Typic hydraquents), District Gleisol (Typic endoaquepts), Gleisol fluvik (Fluventic endoaquepts) and Cambisol and Cambisol oxic (Typic dystrudepts). In addition, the results of the measurement of carbon stocks in the small island of Ambon (Molluccas Province) obtained an average carbon of 47 tons/ha consisting of sago seedling, sapling, poles and trees levels of 176, 77, 89, 51 trees/ha, respectively. For comparison, the carbon stock in Ambangah River (West Kalimantan Province) is 42 tons/ha consisting of sago seedling, sapling, polishing, trees respectively 2, 3, 107, 72 trees/ha and in Sentani (Jayapura City) and Jayapura Regency (Papua Province) 53 tons/ha consisting of sago seedling, sapling and polishing levels, trees 399, 81, 23 trees/ha, respectively. This situation indicates that the carbon content of sago is highly dependent on the composition of the growth strata of sago and other tree species in it.

**Thi Kieu Oanh Nguyen[1]* and Thi Phuong Thao Ung[2]**

[1]Nguyen, Mekolink Co., Ltd, Long Xuyen, An Giang, Vietnam

[2]Ung, Science and Technology Ninh Thuan Department, Phan Rang, Ninh Thuan, Vietnam



# The Impacts of Supermarkets on Local Fruit and Vegetable Farmers in Vietnam: Opportunities and Obstacles for Small-scale Farmers

This study aims to examine the effect of supermarket channels on fruit and vegetable farmers' markets in Vietnam. Vietnamese fruit and vegetable farmers are currently building ties with and adapting to potential competition from supermarkets. This research aims to identify the best solutions to allow small-scale farmers access to modern channels. The existing data reveals that fruit and vegetable farmers in Vietnam can be divided into three main groups: (1) peri-urban and industrial-zone farmers, (2) rotational-cultivation-area farmers and (3) smallholders with average farm size of 36 $m^2$ or smaller (PROMOCEN & VIETRADE 2008). Group 1 farmers produce fruits and vegetables generally to supply the urban market, where supermarkets are increasingly present and popular. Urban consumers in Vietnam tend to shop in supermarkets for high-quality fruits and vegetables because of rising food safety concerns. In addition, farmers in this group have land use restrictions because of urbanisation. Therefore, these farmers have changed their focus to producing high-quality products to capitalise on this change in consumer mood. Group 2 farmers have farms of larger size and more marketplaces than do farmers in Group 1. Group 2 is the main group of farmers that supply fruits and vegetables to the entire country; their produce is sold to urban and rural markets, depending on the physical proximity of the farm to the type of market. Group 2 farmers often become members of farmers' cooperatives as a means of improving their market systems beyond supermarket development. There are three types of cooperatives in which such farmers participate. This paper discusses these cooperatives in detail. Group 3 farmers have the smallest share of the fruit and vegetable market in Vietnam. They generally produce fruits and vegetables for self-consumption and sell a modestly proportion of their produce in local markets. Thus, the supermarket revolution in Vietnam is not likely to affect their business

**Audience Take Away:**

- Understanding the effect of supermarket channels on fruit and vegetables farmer's markets will help the farmers from developing countries like Vietnam plan and vision to change to adapt to the new environment
- The audiences can learn more about the changing of fruit and vegetables value chain in developing countries, particularly in Vietnam. Then, make the decision to their hometown situation
- In this research, we provide the overview and the trend of fruit and vegetable market in Vietnam and the growing of supermaket as well as the reduce of wet market. So, it will benefit for both audiences in private sectors and government, who would like to study the market of veggies in developing countries
- For the audiences who are farmers, it will provide them the vision of veggies value chain and how to improve their position in the value chain to improve their benefit along the way
- The SWOT analysis provided in this research will provide deaper understanding to small scale farmers in developing countries. Based on real case of Vietnamese small scale farmers, audience can link to their own cases and apply to potential solution in their own countries

**Biography**

Oanh Nguyen graduated Master of Global Food and Agricultural Business at The University of Adelaide, Australia in 2020. Then, she returned to her home country Vietnam and launched Mekolink Co., Ltd – the Social Entrepreneur works closely with Vietnamese farmers. Meanwhile, Oanh Nguyen participated to workshops and project in agriculture areas to work with other researchers and lecturers from University, this help her have play an important role in linking between academic and practical, connecting the private sector with governments and the experts. She is currently working on the Sandpit Project called "Sustainable Intensification: Integrating Aquaculture into Food Systems" in Vietnam

**Peter Stevenson**

Compassion in World Farming International, River Court, Mill Lane, Godalming, GU7 1 EZ, UK



## Rethinking the role of livestock to meet the Sustainable Development Goals

Industrial animal agriculture out-competes small-scale food producers in the Global South, thereby impairing their livelihoods and SDG 1. Industrial livestock production uses human-edible crops to feed animals which they convert very inefficiently into meat and milk; this undermines SDG 2's objective of achieving food security (SDG 2). Industrial livestock's huge demand for feed has fuelled the intensification of crop production which, with its use of monocultures and chemical fertilisers and pesticides, has led to overuse and pollution of ground- and surface-water, soil degradation, and biodiversity loss. All this works against the environmental objectives of SDGs 2,6,14 & 15. Increasing demand for land to grow soy and cereals for the rising number of industrially farmed animals, and as pasture for cattle, leads to expansion of farmland into forests and savannas with massive loss of wildlife habitats and biodiversity as well as release of stored carbon into the atmosphere; this impairs SDGs 13 (combatting climate change) and15 (halting deforestation and biodiversity loss). Industrial livestock production contributes to the emergence, spread and amplification of pathogens, some of which are zoonotic so undermining SDG 3 on health. Industrial production is also dependent on the routine use of antimicrobials which leads to antimicrobial resistance in animals which can be transferred to people again impairing SDG 3. To halt livestock's harmful impact on the SDGs and to turn the sector round to being supportive of them, we need to rethink the role of livestock. Animals only make an efficient contribution to food security (SDG 2) when they are converting materials we cannot consume – grass, crop residues, by-products and unavoidable food waste - into food we can eat. Only feeding animals in this way will lead to a substantial reduction in global meat production and consumption. This will benefit public health (SDG 3) in high consuming countries and is essential to meet the Paris Agreement's climate goals (SDG 13). We need to shift from industrial livestock production to sustainable forms of animal farming. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services and the European Commission identify organic farming, agro-ecology, agro-forestry, and low-intensive permanent grassland as sustainable practices. Such nature-based farming can support the environmental objectives of SDGs 2,6,14 &15. Such farming can also improve the productivity and hence livelihoods of farmers in the Global South so benefiting SDGs 1 & 2.

**Ana Salvatierra Rojas[1]*,Jose Acosta Barbosa[1],Victor Torres Toledo[1],Kerstin Lohr[2], Juan Maranon Berrazueta[2], Juan Lecaro Davila[2]**

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## Feasibility study for the introduction of renewable energies in the organic cacao supply chain in Ecuador

Cocoa is an essential source of income and employment in rural regions, particularly for the five to six million small-scale farmers responsible for producing more than 90 percent of the world's cocoa supply. The cultivation of cocoa beans provides a living for around 50 million people worldwide. The exceptional quality of the cocoa beans that Ecuador produces has led to the country's rise to prominence as a leading cocoa producer. This is in contrast to the country's large-scale production of cocoa, which has kept it from achieving this status. The amount of cacao produced per hectare in Ecuador has increased at a rate comparable to an exponential curve during the previous 10 years. Ecuador is fortunate geographically, with a wide range of climates, altitudinal floors, being on the equator line and having extremely excellent and consistent radiation levels throughout the year, which benefits significantly from renewable energy sources. Nowadays, small-scale applications are successfully used in the agricultural sector to set up sustainable agricultural supply chains. They are at the early stage of development. However, for a successful implementation in the agricultural sector, a proper assessment of the energy demand is required. Therefore, a feasibility study on organic cacao supply chains was carried out for the technical and economic viability of Renewable Energy (RE) interventions throughout the production and processing of cacao. The feasibility study involved relevant data collection and on-site assessments, followed by detailed scenarios of possible RE interventions. This information will then be used to model the potential implementation of RE systems under different scenarios in the cacao supply chain. This assessment may guide researchers, stakeholders and policymakers on how to best power technologies used along the organic cacao supply chain while considering environmental mitigation to partially or totally replace non-renewable sources of energy

**Audience Take Away:**

- Analysis of the framework conditions for Renewable Energy (RE) based on technological interventions in Ecuador via a participative mapping of structure, potentials, and problems of the organic cacao supply chains for small producers
- An examination of the production and processing steps accros de suply chain in terms of their economic viability, as well as their technical feasibility
- Offer recommendations for potential technologies based on the energy demand.

**Biography**

Dr. Salvatierra-Rojas studied Food Engineering at the University "Mayor de San Simón" Bolivia and graduated with an M.Sc. in Agricultural Sciences in 2010 at Hohenheim University, Germany. She then joined the research group of Prof. Müller at the Institute of Agricultural Engineering, Tropics and Subtropics group at Hohenheim University. She received her Doctoral degree in Agricultural Sciences in 2021 at the same institution. During her studies, Dr. Salvatierra-

## Alessandro Magrini

Dep. Statistics, Computer Science, Applications – University of Florence, Florence, Italy



## Do subsidies improve technical efficiency of EU farms? An empirical analysis of the Common Agricultural Policy after decoupling

The Common Agricultural Policy (CAP) is an important instrument in the hands of the European Commission to support the economic viability of farms in European Union (EU) countries. The Farm Accountancy Data Network (FADN), a system of annual sample surveys on EU farms, has permitted a large literature on the assessment of the effectiveness of CAP subsidies since their introduction in 1962. Most of this literature has highlighted that subsidies are able to increase farm income, but they may also decrease technical efficiency. Technical efficiency refers to the maximization of the output that can be produced with a given set of inputs, therefore it is an important objective to pursue in order to satisfy the food demand with the least possible environmental impact. The negative effect of subsidies on technical efficiency can be attributed to income stabilization that may discourage farmers to exploit at best the available technology. In 2003, a new attribution scheme was implemented, where decoupled subsidies, i.e., lump sum payments based on cultivation or maintenance of land, were also introduced. Since then, the empirical literature has paid great effort to assess whether the new scheme was able to prevent the negative effect of subsidies on technical efficiency. Unfortunately, most existing studies focus on a limited number of EU countries, typologies of subsidies and temporal interval, therefore an overall assessment of the impact of CAP subsides on technical efficiency is currently unavailable. In this talk, we try to overcome the limitations of existing studies by considering the period 2004-2020 (17 years) and 131 EU regions, i.e., all time points and geographical regions currently available in the FADN since decoupling, as well as all typologies of subsidies, i.e., on production, on investments, for rural development, and decoupled ones. A panel stochastic frontier model with translog production function is fitted to regionally aggregated data separately for three different classes of economic size. In our results, all the typologies of subsidies have a significantly positive effect on technical efficiency in most countries, especially subsidies on production and decoupling subsidies, with a greater prevalence of significantly negative effects across EU countries as the economic size increases. The magnitude of the estimated effects across EU countries and classes of economic size provides a valuable information about regional differences among EU farms that could guide future refinements of the CAP towards an increasingly sustainable development of EU agriculture.

**Audience Take Away:**

- The Common Agricultural Policy (CAP) is the most important instrument in the hands of the European Commission at support of the economic viability of EU farms
- After some evidence on the decrease of technical efficiency in some EU regions due to the initial implementations of the CAP, the decoupling reform in 2003 has received great attention from analysts due to its potential to make farmers purse both economic and environmental objectives
- The empirical analysis of the CAP is important to support policy makers in future refinements aimed at achieving an increasingly sustainable development of EU agriculture

**Biography**

Alessandro Magrini achieved the PhD degree in Applied Statistics in 2014 and he is currently Assistant Professor of Economic Statistics at the Department of Statistics, Computer Science, Applications – University of Florence, Florence, Italy. He teaches the course Business and Economic Statistics for the Bachelor's Degree programme in Statistics, and the course Statistical Methods for Forecasting and Quantitative Marketing for the Master's Degree programme in Statistics and Data Science. His main research interests include time series modelling and forecasting, productivity analysis, sustainability assessment, policy evaluation, bankruptcy risk prediction. He has authored and co-authored several articles in high-quality scientific journals like Applied Stochastic Models in Business and Industry, Advances in Statistical Applications, Quality & Quantity, and Social Indicators Research

**Abdul Khalil Gardezi[1]*, Kenia Nallely Romero Andablo[1], Guillermo Carrillo Castañeda[2], Cristian Alejandro Ali Gamboa[1], Hector Flores-Magdaleno[1], Jose Abel Lopez Buenfil[3], Manuel Ortega Escobar[1], Miguel Jorge Escalona Maurice[4], Mario Ulises Larque Saavedra[5] and Gabriel Haro Aguilar[1]**

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## Evaluation of the vigure of roselle crop (Hibiscus sabdariffa L.) using rhizobacteria for phytoremediation purposes under conditions of stress caused by copper sulfate (CuSo4)

The objective of the research was to evaluate the vigor roselle crop (Hibiscus sabdariffa L.) using rhizobacteria of Pseudomonas fluorences under conditions of stress caused by copper sulfate (CuSO4), as an alternative for the phytoremediation of soils contaminated with wastewater. The experiment was conducted at the facilities of Campus Montecillo in the Colegio de Postgraduados, Mexico. Seeds of two cultivars of jamaica (cv. Creole and cv. Spider) inoculated with cells of six bacterial strains (M83, M67, M88, L168, M82_A and M82_C), which were planted and grown in a greenhouse to determine: stem length (SL), root length (RL), dry root biomass (DRB), chlorophyll content (CHC), number of leaves (NL), stem diameter (SD) and radical volume (RV). The implemented experimental design was completely random blocks with a factorial arrangement (4 x 2 x 2 x 2). The concentrations of CuSO4 used in the sowing were 10-2 molar concentration (M) for the cv. Creole and 10-6 M for the cv. Spider. The type of soil was decisive because it caused significant differences in most of the variables evaluated, except in the RL, DRB and RV. Inoculation with bacterial strains caused inhibition in the growth of SD in the cv. Spider at 80 days after sowing (DAS). The strains that promoted the plant growth of roselle were M83, M67 and M82 used in both cultivars. The roselle plants had no negative effects due to the stress condition caused by CuSO4. In general, the cultivar that had a greater tolerance to CuSO4 was cv. Creole, therefore, could be considered as an alternative for phytoremediation of soils contaminated with wastewater

**Audience Take Away:**

- The present research can be a useful tool for all those researchers looking for efficient and environmentally friendly methods for the treatment of soils contaminated with potentially toxic metals. Undoubtedly, bioaugmented phytoremediation with rhizobacteria is a research topic of interest that helps to reinforce the knowledge of academics and students, and thus generate related technologies
- The audience will learn about an option for soil phytoremediation and its ability to be enhanced by plant growth-promoting rhizobacteria
- A practical solution to the growing soil contamination (phytoremediation) is presented, which compared to other technologies tends to be economical, efficient in the removal of soil contaminants and has no adverse effects on the environment

**Biography**

Dr. Abdul Khalil Gardezi studied the Doctorate of Science in Environmental Engineering. Technological Institute of Toluca. Toluca, State of Mexico. México. 20/June/2007. Master of Science in Soil Microbiology. Postgraduates College, Montecillo, State of Mexico. Mexico. May 31, 1986. He has received 80 distinctions in the field of research, teaching and service from 1988 to 2022. He has been selected for the originality of my research, having the best written and oral presentation in the years 2003, 2005, 2008-2022 in international congresses in the United States, London, United Kingdom, Scotland, Berlin, Germany, Mexico, Australia, Canada, China, Switzerland and Italy. He has been honored as one of the 2000 intellectuals of the 21st century by the International Biographical Center, Cambridge, England

**Shiv Vendra Singh*, Sumit Chaturvedi**

School of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar-263145, Uttarakhand, India

## Rice Residue Biochar Transfigures Carbon Footprint under Rice-Wheat System of Indian Indo-Gangetic Plains

Alongside economical produce the India produce 501.73 MT of agricultural residue every year as co-products and140.84 remains unutilized or burned. On-farm burning cause problem of GHGs emission, particulate matters, smoke and volatile matters worsening global environmental and human health. The considering the adversities caused be burning as well as decarbonisation technologies in agriculture as a goal of net zero equation, present experiment was planned to evaluate the residue management as biochar to emission reduction and increase carbon capture under rice-wheat cropping sequence (RWCS) of Indian Indo-Gangetic plains, India. Three residue management treatments viz., No residue (NR), Rice straw incorporation (RI) and Rice straw biochar (BC) were taken into consideration. After two cycles of cropping pattern, the analysis revealed that BC application reduces the CO2 emission by 24.3 % over RI, however, CH4 and N2O emissions by 21.4 % and 12.5 % over RI and 9.8 % and 29.2 % over NR, respectively. Considering the emissions of present experiment and emissions from rice straw burning (MoEFCC, 2021), overall carbon footprint under residue incorporation, residue burning and residue incorporation as biochar for whole IGP (10 Mha) was calculated to calculate the climate mitigation potential. The annual carbon footprint (CF) (sum of all the emissions and inputs in CO2-Ce) under RI increased by 37.2 % and 30.8 % over BC and NR, respectively. Whereas net CF [(Total emissions + Inputs) – Carbon sequestration] under residue burning was estimated to be highest (194.07 Tg-CO2-Ce) followed by RI (45.65 Tg-CO2-Ce) showing net positive emissions however, net negative emissions were found under biochar-based system. The estimated annual carbon offset potential of biochar system over predominant residue incorporation and burning may increase upto 112.3 and 260.7 Tg-CO2-Ce, respectively

### Biography

Dr. Shiv Vendra Singh earned M.Sc. (Ag.) in Agronomy from N.D. University of Agriculture & Technology, Ayodhya, India. Subsequently, doctoral degree in Agronomy from G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India. Currently, he is working as an assistant professor at Graphic Era Hill University, Dehradun, India. Besides, he has received the reputed awards and fellowships from state and national agencies (e.g., Vice-Chancellor Gold Medal, NDUAT, Ayodhya; INSPIRE Fellowship, DST, Young Scientist Award, UCOST-Uttarakhand State Science & Technology Council, Uttarakhand etc.). He possesses nearly 5 years of research experience in the field of biochar based nitrogenous fertilizers production, biochar enrichment, soil quality enhancement, carbon sequestration, GHGs emission and carbon footprint mitigation under biochar-based rice-wheat production system. He has published ~30 scientific publications including full-length research papers in high impact journals, book chapters, conference paper, popular articles and editing book on Biochar for Green Economy to be published by Elsevier. His research interest includes crop nutrient management, waste management, biochar production and diversification

## Safiul Islam Afrad

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# Do rural women participate in homestead plant biodiversity conservation? A case of Homna upazila under Cumilla district

Rural women are playing a vital role in the conservation of homestead plant biodiversity. Therefore, the main objective guided present study was to assess the extent of women's participation in homestead plant biodiversity conservation. The study was conducted in five selected villages of Homna upazila under Cumilla district. A total of 120 rural women were selected using proportionate random sampling technique. Data were collected from September to October, 2020 which were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Statistics such as range, mean, number, percentage, standard deviation were employed throughout the study. Co-efficient of correlation was administered to explore the relationships between homestead plant biodiversity of the respondents and their participation in homestead plant cultivation. Findings reveal that a vital portion (68.0%) of the respondents had educational literacy in medium to large categories family. It is interesting that cent percent of the respondent occupied small to medium sized farm where homestead plant diversity contributed only 9.0 percent to total family income of the respondents. Majority of the respondents (57.5%) had medium contact with different information media having moderate knowledge on homestead plant cultivation. Out of 93 different types of plants recorded in the study area, ladies' finger (4.92) was the most dominant among the vegetables while mango (4.72) among the fruit trees, mahogany (1.72) among the timber trees, chilies (2.52) among the spices, basil (0.68) among the medicinal plants, henna (0.22) among the ornamental plants. The diversity index of fruit (12.52) was found higher than other type of homestead plants. It was also found that participation of the respondents in homestead plants cultivation activities was 59.0 percent that was higher than their husband's participation (41.0%). More than half of the respondent spent 2-3 hour/day in homestead plants cultivation activities. Homestead plant biodiversity of the respondents had positive significant relationships with their participation in homestead plant cultivation. Most important problems identified by respondents were high input price, low yield and limited homestead area, respectively in due course of time. Most important suggestion offered by the respondents was the delivery of agricultural input at low cost and easy allotment of loan for homestead cultivation

**Audience Take Away:**

- The audience will be able learn the status of homestead plant biodiversity along with women's contribution to its conservation in the rural areas
- The researcher can undertake research to improve the women's participation in homestead plant biodiversity. If it can be disseminated in the rural areas homestead plant biodiversity will be improved
- Future research can be undertaken to select the types of plants to be included in backyard and frontyard of the homestead

**Biography**

Dr. Afrad studied Agriculture at the Bangladesh University, and graduated in 1996. He then joined at Patuakhali Science and Technology University as lecturer in the Department of Agricultural Extension and Rural Development. He then joined as Assistant Professor in the same department at Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur, Bangladesh in 2004. He received his PhD degree in 2009 at the same institution. Currently he has been working as Professor and he published more than 90 research articles in different national and international journals

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# POSTERS

## DAY 01

2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

01-03 SEPT

**D. J. Patel**

Ex. Principal & Dean, B. A. College of Agriculture, Anand Agricultural University, Anand -388110, Gujarat, India

## Soil fumigation with dazomet and metham-sodium for manangement of root-knot nematodes in protected cultivation

Phytonematodes are microscopic ubiquitous browsers of plants. Among 10 % of 30,000 parasites identified so far, root- knot nematodes ( Meloidogyne incognita and M. javanica) are attacking almost all agricultural and horticultural crops across the country. These root- knot nematodes have more than 3000 host plants. About 125million dollars are estimated to be lost due to different plant parasitic nematodes globally. Among different agricultural and horticultural crops, horticultural crops are more prone to phytonematodes. Because of the most congenial conditions prevailing in protected cultivation/ poly houses, plant parasitic nematodes especially root- knot nematodes ( Meloidogyne spp.) become more aggressive on crops like cucumber, capsicum, gerbera, carnation and other flowering plants, tomato and many vegetable crops grown in it. If nematodes attack in the early crop growth stage., then crop is totally failed incurring heavy financial losses to the farmers. In the first year, farmers may harvest good production but nematodes infection will certainly be there which is generally not noticed by farmers as no clear symptoms are visible on the crop by the farmers e.g. cucumber, capsicum, etc. However when farmers grow second crop either cucumber or capsicum without taking any control measures, then the entire crop gets failed due to severity of nematode infection. Therefore, there is a need to fumigate soils of poly houses with effective soil fumigants to bring down nematode population and subsequently, it should be fumigated every alternative year to manage nematodes in order to get desired and profitable crop production. Among 8 different treatments including soil fumigation with metham- sodium and formalin tried on tomato, capsicum and carnation in poly houses at SKSHPAU, Palampur (HP),MPKV, Rahuri ( MS) and UAS, GKVK, Bangalore ( Karnataka) respectively, soil fumigation with Metham-Sodium @ 30 ml/m2 alone or in combination with neemcake @ 200 g/ m2 enriched with either Purpureocillium lilacinum or Pseudomonas fluorescens reduced root- knot infection by 95.45 % and there by increased tomato production by 100.91 % (ICBR : 1:3.38) over control- untreated check at Palampur. Similarly at Rahuri also, there was 54.6 % reduction in root- knot disease with 32.84 % increase in yield of capsicum (ICBR : 1:2.58). The same treatment on when tried on carnation at Bangalore also could check root- knot disease by 68.16 % and there by increased 361.65% flower production over control. However .soil fumigation with Formalin even @ 225 ml/m2 alone on in combination with neem cake enriched with either bio agents was not effective and was almost at par with control treatment for nematode management in tomato, capsicum and carnation at respective center. During 2013-14 and 2014-15, experiments conducted to manage root- knot nematodes through soil fumigation with Dazomet and Metham Sodium on tomato and cucumber in poly houses at CSKHPAU, Palampur in poly houses indicated that soil fumigation with Dazomet and Metham Sodium each @ 40 g or ml/ m2 significantly reduced root- knot disease by 78.3 % and 74.7 % with 110.9 % (ICBR 1:4.38) and 144.2 % ( ICBR: 1:5.69) increase in yields of tomato respectively. While Dazomet and Metham Sodium each @ 40 g or ml/ m2 significantly reduced root- knot disease by 74.0 % and 74.2% with 63.7 % (ICBR 1:3.76) and 65.1 % ( ICBR: 1:3.84) increase in yields of cucumber respectively. It is , therefore, advised that farmers must go for soil fumigation either with Dazomet or Metham Sodium before taking any crop in protected cultivation.

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# The use of attractants and biofortification with nutrients in seed production of white clover (Trifolium repens L.)

White clover (Trifolium repens L.) is one of the most important, perennial, multi-seeded legumes grown in Poland. The cultivation of white clover ranks third in terms of economic importance among fine- seeded legumes in Poland. T. repens is distinguished by high digestibility of the organic matter and high protein content. The Polish register of varieties includes eight varieties of white clover, recommended for pasture cultivation with grasses, permanent mountain pastures or dry soil. T. repens is a natural allotetraploid, allogenic species and is characterized by an entomophily, xenogamic pollination pattern. One of the reasons for the low yield of seeds of this species is the insufficient supply of pollinating insects in the areas where they occur. The main pollinators of T. repens are representatives of the Hymenoptera order of the true bee family (Apidae), the honeybee Apis mellifera L. and various species of bumblebees (Bombus). In Polish conditions, however, the role of bumblebees in pollination of white clover does not exceed 12-15%. Honeybees make as much as 85-88% of pollination of white clover. In order to improve pollination of clover flowers and seed setting, bee attractants and biofortification with microelements can be used. The attractants are based on substances that occur naturally in nature - aromatic compounds and pheromones, which stimulate insects to work, and its active ingredients imitate the pheromone secreted by scout bees to indicate the source of the honey flow to collectors. Hence, the aim of the research was to develop an innovative technique of seed production of white clover. The research was conducted in the central-eastern part of Poland ($\varphi$ = 51°34′, $\lambda$ = 23°02′, H = 157 m above sea level), in the years 2015-2017. The experiment was established using the randomized sub-block method, in a dependent, split-plot design, in four replications. The first order factor was the application of the attractant - Pollinus, in two terms and the control object, without the use of the attractant. The second-order factor was biofortification of clover with fertilizers. The object of the research was the Polish variety of diploid white clover. The meteorological conditions of the growing season had a decisive influence on the seed yield and the main elements of its structure. The highest seed yield was obtained in 2016, characterized by more favourable thermal conditions and rainfall in the clover generative subperiod, and the lowest in the extremely dry subperiod, 2015. The attractant application significantly increased the number of heads, the share of seeds in the head, the weight of a thousand seeds and their yield, as well as seed germination. Biofortification with microelements (B + Mo) significantly increased the number of inflorescences per 1 m2, the number of seeds in the head and their yield per unit area, compared to standard PK fertilization. The best results of the attractant application were obtained when the preparation was applied twice, in stages 60 and 65, on the 99° BBCH scale, compared to the control object. The highest yield of T. repens seeds was obtained thanks to biofortification with boron and molybdenum and the use of the Pollinus attractant in relation to fully flowering plants.

**Biography**

Dr. Afrad studied Agriculture at the Bangladesh University, and graduated in 1996. He then joined at Patuakhali Science and Technology University as lecturer in the Department of Agricultural Extension and Rural Development. He then joined as Assistant Professor in the same department at Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur, Bangladesh in 2004. He received his PhD degree in 2009 at the same institution. Currently he has been working as Professor and he published more than 90 research articles in different national and international journals

**Gunay Talibova[1]*, Rasim Mammadov[1], Kenan Kutuk[2], Elmixan Yusifov[2]**

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# Applying Integrated Pest Management strategy as an alternative method for Tuta Absoluta control in Zira settlement, Azerbaijan

Integrated pest management means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimize risks to human health and the environment. 'Integrated pest management' emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms. In the 1950's entomologists discovered that insects were developing resistance to pesticides because of their overuse and abuse. "Integrated control" was developed emphasizing use of selective insecticides so that natural enemies were conserved in the system. This integration of control techniques was expanded in later years to include other management options such as resistant crop varieties, crop rotation and other tactics and to include weed and diseases as pests in addition to insects. As crop protection agronomist 4 year I have been using chemical control against various pests and diseases. The most problematic pest in our region is tuta absoluta because this post is quarantine pest for Russia, which is considered the main market for Azerbaijan and another countries. Bemisia tabaci is also economically important pest, but it is more controllable than tuta absoluta. Why it is more difficult to control tuta absoluta than other pests? Because it can easily get resistance to pesticides, also immature stage (I mean larva) is inside the leaves stems and fruits where contact insecticide cannot reach in). All this facts forced us switch to IPM strategy. Why we did not apply this method on previous seasons? Because nobody before had any experience with IPM on tomato in Azerbaijan. Some growers began but could not continue because of high infestation of tuta and bemisia. Zira settlement is an area where tuta absoluta and bemisia tabaci population is high. Less IPM knowledge and practice led to increasing pests' population (especially bemisia population increased and spread TYLCV) and as a result switching to chemical protection. Before beginning to the new growing season, we considered all mentioned facts beforehand and decided to aplly IPM on 10ha.Another 10ha remined with chemical control in order to figure out which method is reasonable from all aspects-yield volume, expenditures, the number of workers needed and etc

**Introduction plan was as following:**

1st introduction-on September 9 (week 37) / 2 adult Macrolophus pygmaeus per sq m and 4 Eretmocerius eremicus eggs per sq m.

2nd introduction-on September 27 (week 39) / 2 adult Macrolophus pygmaeus per sq m and 4 Eretmocerius eremicus eggs per sq. m.

The next 2 macrolophus introductions was planned for February (week 5) and for March (week 7) if needed.

**After decent liquidation disinfection there was not any pests in greenhouse (regarding to monitoring results) But after receiving propagation we also received different pests on seedlings. Before beneficials introduction we focused to decrease pests level as minimum as possible.Fighting plan was as follows:**

Week 34: Spraying Bacillius trunginensis 32000 IU/mg against tuta absoluta (max concentration 150 gr/hl and dripping Ciantraniliprole 200SC (concentration 50 ml/da) against bemisia tabaci.

Week 35: Bacillus treatment was applied repeatedly every week till introduction date.

After introduction of beneficials use of chemicals' (of course compatibles) was decreased to minimum. Eretmocerius eremicus supported Macrolophus pygmaeus on control of bemisia tabaci. Monitoring results showed that Macrolophus p. prefer feeding on bemisia tabaci and tetranicus urticae more than tuta absoluta. Therefore, controlling of tuta is requiring

additional methods, such as black sticker and water traps with feremon (see photo 3 black stikers on palets and by perimeter of greenhouse). Initial number of feremons per hectare was 44 pieces. Beginning from end of the October (when pests' population try to find warm place) tuta population began to grow inside the greenhouse. That is why the number of feremons was increased till 88 per hectare. That moment Flubendiamid 480SC (consentration 100ml/hl) was used. Spraying repeated with 7day interval (see monitoring table of tuta absoluta).

On December-January period the number of Macrolophus decreased and tuta absoluta increased.

On this period Bacillius truniginensis was used intensively (4-5 times with 5 days interval).It helped to keep tuta under control. Beginning from March Macrolophus population began to grow and it was enough for controlling tuta absoluta till the end of the season. So,no chemicals o bacterial products were used till the end of the season. In conclusion, chemical and biological controlled compartments were compared. There was more number of damaged fruit by leaf miner on chemical treated field than biological part. Total yield was higher in chemical part than biological part because of some plant loss in biological part as a result of botrytis infection. Botrytis cinerea control was difficult in biological side because of more humidity (variety -Fujimaru F1 was not resistant to botrytis cinerea, leaves from deleafing stayed on the ground and it led to additional humidity inside the greenhouse).

**Audience Take Away:**

- Integrated Pest management strategy practice in warm climate and high infestation areas with economically important pests
- Effect of some insecticides (compatibles and incompatibles) both on beneficials and pests
- Comparison of chemical and bio control

**Biography**

T. Gunay studied Biology at Baku state University, Azerbaijan and graduated as BS in 2006.She took "Phytopathology and Enthomology" course at Wageningen Academy in 2019 and "Sustainable Agricultural Land Management" course at Florida University in 2022. Since 2017 she is working as Crop Protection agronomist at "Baku Agropark" 20 ha tomato greenhouse.

# KEYNOTE FORUM

## DAY 02

2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

01-03 SEPT

**Maximilian Lackner[1]*, Daniel Kallinger[2]**

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# NPK fertilizer replacement by bacterial communities of Azotobacter chroococcum, Bacillus megaterium & Bacillus mucilaginosus

Since plants extract nutrients from soil, particularly monocultures need fertilizers for higher yields of production. Classic mineral fertilizers are of the NPK type (nitrogen + phosphorus + potassium). The nitrogen in mineral fertilizers, which is cheaper than organic one, comes from ammonium or urea, which have been produced in an energy-intensive process. Phosphorus is getting a scarce natural resource, so prices of fertilizers are expected to increase in future, putting farmers and their customers at risk. Several bacteria are known to fix nitrogen from the air, and others were reported to make P and K contained in mineral rock soluble and thereby bioavailable. The authors have obtained the best results with Azotobacter chroococcum to fix nitrogen, with Bacillus megaterium to solubilize phosphate and with Bacillus mucilaginosus to solubilize potassium. Growth experiments were made with barley, wheat and sweet sorghum. The bacteria were either applied to soil or to the seeds. Plant growth was studied based on germination rate, plant health (green) and plant growth (height). The bacterial consortium can help achieve good yields at low, stable production costs, with smaller environmental footprint than associated with mineral fertilizer only.

**Biography**

Maximilian Lackner is technical chemist and process engineer. He has been lecturer at Vienna University of Technology (VUT) since 2005, at JKU (Linz, Austria) since 2014 and at the University of Applied Sciences Technikum Wien since 2015. He studied Technical Chemistry at VUT, where he also earned his PhD degree and completed his habilitation in chemical engineering. He obtained a Global Executive MBA from LIMAK University in Linz, Austria. Between 2004 and 2011 he has held several senior positions in the petrochemical industry in Europe and Asia. He has founded five companies. His expertise spans process engineering, chemical engineering, combustion, climate change mitigation, antimicrobials, online microbiology, innovation, leadership and entrepreneurship, as well as bioplastics (PHA, PHB).

**S. M. Rezaul Karim[1]*,Ferdoushi Rahaman[1], Abdul Shukor Juraimi[1], Mohd Y. Rafii [1], Md. Kamal Uddin[2], Lutful Hassan[3], Abul Kashem Chowdhury [4], Bashir Yusuf Rini[1], Oladosu Yusuff[5], H M Khairul Bashar[1], and Akbar Hossain[6]**

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# Allelochemicals in Rice - A Biochemical Tool for Defensing Against Weeds

Rice is a key crop for meeting global food demand and ensuring food security. However, the crop has been facing great problem to combat the weed problem. Synthetic herbicides, pose a severe threat to the human health and agro-ecosystems. Allelochemicals for using as bioherbicides, are powerful tools for biological weed management. The dynamics of plant species in various situations are also determined by allelopathy. Phenolics and momilactones are the most common allelochemicals responsible for herbicidal effects. The allelochemical dispersion is influenced not only by crop variety but also by climatic conditions. This study insights the concepts of allelopathy and allelochemicals, types of allelochemicals, techniques of investigating allelopathic potential in rice, modes of action of allelochemicals, pathways of allelochemical production in rice, biosynthesis of allelochemicals in rice, factors influencing the production of allelochemicals in plants, genetical manipulation to develop allelopathic traits in rice, significance of rice allelopathy in sustainable agriculture etc. Understanding this biological phenomenon may thus aid in the development of new and novel weed-control tactics while allowing farmers to manage weeds in an environmentally friendly manner

**Audience Take Away:**

- Weed problem in rice is a global issue in agriculture. We need to manage this yield constraint is a eco-friendly way so that the yield of rice is increased and the agroecosystems are sustained. In this regard, using allelochemical-based herbicides to control weeds is one of sustainable options.
- Concepts and types of allelochemicals, techniques of investigating allelopathic potential in rice, modes of action of allelochemicals, pathways of allelochemical production in rice, biosynthesis of allelochemicals in rice, factors influencing the production of allelochemicals in plants, genetical manipulation to develop allelopathic traits in rice, significance of rice allelopathy in sustainable agriculture etc.
- Understanding this biological phenomenon may thus aid to develop new bioherbicides and to help the farmers to control weeds in a sustainable way.

**Biography**

Professor Dr. S. M. Rezaul Karim is an Agronomist with specialization in Weed Science having teaching and research experience of more than 35 years. Prof. Karim obtained his M. Sc. Ag. in Agronomy from Bangladesh Agricultural University, Mymensingh in 1981, M. Phil from University of Reading, England, UK in 1991, PhD from University of Aberdeen, Scotland, UK in 1999. He is an author of five books of Weed Science and three book chapters in the same discipline. He has published more than 110 papers in reputed journals. Prof. Karim joined the Universiti Putra Malaysia as IOI Chair on 12 November 2021.

**Vijayan Gurumurthy Iyer**

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# Environmental Health Impact Assessment (EHIA) Process for Prediction and Assessment of Environmental Health Impacts on the Agriculture and Horticulture Environment

This article discusses the environmental health impact assessment (EHIA) process that is for the prediction and assessment of environments health impacts on the agriculture and horticulture environment. "Environmental health impact assessment" (EHIA) process can be defined as the systematic identification and evaluation of the potential health impacts (effects) of proposed projects, plans, programs, policies, or legislation actions, relative to the physicalchemical-biological environments can be referred to as the "natural environment," or the "bio-physical," and the cultural, and the socioeconomic environments," or the " "man-made environments" of the total environment. The health impacts of projects, plans, programs, policies, or legislative actions should be considered in the decision - making process. Because of the important of these concerns, an environmental health impact assessment (EHIA) process is proposed. EHIA statements referred to as "description of the affected environmental health and ecological environment" or "description of the environmental health setting without the project." This development of environmental health inventory represents important step to assess and evaluate the health and ecological risks of primary and secondary impacts. The primary purpose of the EHIA process is to encourage the consideration of the environment in planning and decision making and to ultimately arrive at actions which are more environmental healthily compatible. The environmental health inventory serves as the basis for evaluating the potential impacts on the environmental health, both beneficial and adverse, of a proposed action. Therefore, project planning and decision making should include the integrated consideration of technical, economic, environmental, social and other factors. The most important of these considerations can be referred to as "the three Es" (Engineering or technical, economics, and environment) in project planning and decision making. Prior to the EHIA process, technical and economic factors dominated the decision making process. Three of the most significant terms concerned with the EHIA processes' compliance are "environmental health inventory," "environmental heath impact assessment" and "environmental health impact assessment". Environmental health impact assessment (EHIA) process is discussed for seed-cotton ginning, naturally pigmented colour cotton, sustainable plant breeding, CCLC roller ginning process/RCF roller ginning process, and bacterium Bacillus thuringiensis/ Bt cotton, (Bt Genetically modified Seed-Cotton/Kapas)

**Audience Take Away:**

- The audience will be able to use my PPT for the environmental health impact assessment (EHIA) proces The audience can be able to teach and research environmental health impact assessment (EHIA) process in agriculture and horticulture.
- This provide a practical solution to a major environmental health problem in agricultural and horticultural areas that could design efficient and agricultural and horticultural project viabilities. It shall improve the accuracy of a design, or provide new information to assist in a design problem. To control primary and secondary and tertiary environmental health impacts.

## Biography

Dhanbad , India and graduated as M.Tech in 1998. He has served as Technical officer (Ginning) in Indian Council of Agricultural Research at Central Institute of Agricultural Engineering, Bhopal and Central Institute for Research on Cotton Technology, Bombay during 1985-1998 . He then joined as external Ph.D scholar and received Ph.D. in Environmental Science and Engineering in 2003 at the same institution. After three years as postdoctoral fellowship (PDF) supervised by Prof. Dr.Nikos E. Mastorakis, WSEAS, Athens, Greece and published 67 PDF elaboration research papers in WSEAS transactions and proceedings. . He has served as Professor of Environmental Science and Engineering at Haramaya University, Haramaya, Ethiopia during 2014-2015. He has published more than 400 research articles in SCI journals sand proceedings. He has published more than 90 books. Ther are more than 4000 citations in his credit. His h.index is 54

# SPEAKERS

## DAY 02

2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

01-03 SEPT

**Ghimire Bimal Kumar[1]*, Changwan Lee[2]**

[1]Department of Crop Science, College of Sanghuh Life science, Konkuk University, Seoul, South Korea

[2]Department of Mechanical Engineering, COO MIJ Co., Ltd. Chuncheon, Gangwon-do

## Evaluation of A Silver-ion Based Purification Unit for Agriculture, Horticulture Livestock, Sanitization and Drinking Water System

Globally, Recently, there is a growing concern about the number of pests exhibiting resistance to existing chemical pesticides in the agriculture and horticulture sector. Silver (Ag+) ion water is used both as an emergency drinking water disinfectant and impregnated in some water filters to prevent microbial regrowth. It is non-toxic plant, non-polar in nature and is safe and harmless to human beings. eco-friendly agriculture, prevention of different diseases, and important in the field of animal husbandry, and fisheries. Several previous studies have reported the important role of silver ions in destroying the enzymes of bacteria important to transport the nutrient into the cells, destabilizing the bacterial cell wall and modify energy metabolism within the cytoplasm, modifying the nucleic acid/DNA synthesis of bacteria thereby disrupting bacterial division and reproduction. Silver ions water are being increasingly used in the agricultural sector due to their insecticidal and antimicrobial properties. The present study consisted of initial assessment of silver ions system device with unique features that can be useful in the agriculture, husbandry, and water sanitization system. Silver ions water produce by our innovative device is highly eco-friendly for the water protection, which requires no chemicals treatments. The device is characterized by high accuracy of dose rate control system and precise ions level that prevent the chances of recontamination. The efficacy of the technology is independent of water temperature and conditions, thus effective for entire water system. The silver ions supplied in the water system are safe for human consumptions. Other additional advantages include, highly convenient in handling due to easy chargeable system (solar energy and battery to battery chargeable systems). Due to high production capacity of the device, it is convenient to produce large quantity of silver ions required in the field of agriculture, livestock, and sanitizations and public drinking water supplies. The device consisted of SIM that enable the internet connectivity that helps for easy communication, monitoring and education to people about the data and results obtained from the silver ions water treatments for long term basis. In the present study, a number agriculture-based experiments have been analyzed, examined the efficiency of device and silver ion quality, its application preventing diseases, growth parameters of crops, livestock and sanitization have been evaluated. Our observation show that the silver ions devices can act as effective disinfectant mechanism and maintain high performance for long time.

**Audience Take Away:**

- Audience learns to improve eco-friendly agriculture and horticulture products. • Can build a data center on the farm premises.
- The most important is monitoring the impacts and maintenance. Yes, it provides a practical solution to a problem that could simplify or make a designer's job more efficient.
- The device developed for water purification purposes first and was implemented in various South Asian Countries since 2017, Newly Innovated in 2022 with Silver- Ion output (high capacityhydrophone 30 ton/a day) with concentration control system 0.1-15ppm is applied in Korean Farms.

**Biography**

Dr. Bimal Kumar Ghimire is currently an assistant professor in the Department of Crop Science, College of Life Science, Konkuk University, Seoul, South Korea. He received his MS in Botany from NBU, India. He obtained his Ph.D. in Agriculture Science from Kangwon National University, South Korea, in 2008. Subsequently, he joined the Department of Botany, Sikkim University, India from 2011-2014. He has edited and written several books and contributed chapters on different aspects of plant sciences including light sources generally used in controlled agriculture, genetic transformation, and secondary metabolites of medicinal plants. His research interests and experience include plant anatomy, genetic diversity in bioenergy crops, tissues and cell culture, and genetic transformation, and published more than 100 articles in peer-reviewed journals and books. Recently working on silver ions water which is well-known for its antibacterial, antifungal, and anti-inflammatory properties

**Alicja Niewiadomska[1]*, Agnieszka Wolna – Maruwka[1], Adam Kaminski[2], Katarzyna Gluchowska[1], Zyta Waraczewska[3]**

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[2]International Chemical Company S.A., Luzycka 50, 66-200 Swiebodzin, Poland
[3]Institute of Natural Fibers and Herbal Plants National Research Institute, Poland
[2]Department of Mechanical Engineering, COO MIJ Co., Ltd. Chuncheon, Gangwon-do

## Influence of an innovative biopreparation on soil microbial activity and lettuce yielding

Currently, due to people's growing awareness, it is increasingly important to search for alternative preparations to chemical crop protection products and mineral fertilisation, which could be applied in agriculture and horticulture in order to increase the fertility of soil, improve its sanitary condition and yield. The aim of the study was to assess how an innovative biopreparation made from granules consisting of grain mill waste (oat husks) and molasses, which were inoculated with selected strains of fungi of the Trichoderma genus, affected the microbiological properties of soil, its biodiversity and sanitary condition, as well as the yield and morphological traits of lettuce. The experiment was conducted under controlled conditions in a greenhouse, on two types of soil with different organic matter content (soil with higher and lower content of nutrients). The assessment of microbiological properties included measurement of the soil biochemical activity, i.e. the activity of dehydrogenases (with the Thalman method) and catalase (with the Johnson and Temple method). The sanitary condition of the soil was assessed by measuring the counts of pathogenic fungi of the Fusarium and Alternaria genera with the serial dilution method. The Komada selective medium with ox bile, chloramphenicol, streptomycin, borax, and PCNB (pentachloronitrobenzene) was used for the Fusarium fungi. The Hong and Pryor medium with 20% lactic acid, botran (dicloran), bayleton (triadimefon), and streptomycin was used for the Alternaria fungi. The metagenomic analysis of the gene encoding 16S rRNA was used to assess the biodiversity of the soil microbiome. The analysis was based on the hypervariable region V3-V4 of the 16S rRNA gene. The research showed the stimulating effect of the biopreparation made from granulated oat husks inoculated with fungi of the Trichoderma genus (WMT-P) on the phytosanitary properties of the soil. In comparison with the conventional cultivation, the preparation limited the growth of pathogenic fungi of the Fusarium and Alternaria genera on the lettuce plantation. The biopreparation also increased the dehydrogenase activity in the soil, the biological index of fertility (BIF), the yield (fresh weight) of lettuce and the biometric parameters of the root. The metapopulation analysis of the soil samples showed that the innovative biostimulant increased the soil content of Acidobacteriota and beneficial bacteria of the Gemmatimonadota and Chloroflexi phyla.

**Audience Take Away:**

- It is very important to me that my knowledge contributes to the further development of technology and the implementation of innovative fertilizers, the use of which will allow to obtain the highest possible yields while minimizing the level of environmental hazards
- The result of research and development works carried out by me there is a formula of different types of organic fertilizers made on the basis of biochar (with the addition of molasses and oat husk) inoculated with appropriate microorganisms, along with the method of their application and production
- Innovation fertilizers increase the soil capacity water, improve soil biological fertility, show a strong phytosanitary effect, provide 100% organic activated carbon, improve plant resistance to stress factors, e.g. drought, improve plant nutrition, and show the highest CO2 sequestration capacity in soil compared to available competitive solutions

**Biography**

Alicja Niewiadomska is a professor at the University of Life Sciences in Poznań, She is Associate Professor (achieve habilitation degree). Last time she was responsible for the implementation of 2 research projects. She has completed many commissioned works and research projects, the subject of which was the role of microorganisms in promoting plant growth, as well as the management of organic substrates of various origins as fertilizers. She is the author of 86 scientific publications

**Antonio Berardi[1]*, Gianvito Ragone[2], Alessandro Leone[1], Enrico DeLillo[2], Antonia Tamborrino[1]**

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[2]Department of Soil, Plant and Food Sciences, Entomological and Zoological Section, University of Bari Aldo Moro, Via Amendola 165/A, 70126 Bari, Italy

## Experimental investigation of a microwaves pilot plant

Almonds (Prunus dulcis) are among the most popular dried fruits all over the world for their high nutritional and health value. The almond is a crop practiced in many countries of the world including temperate, sub-tropical, and tropical regions in which is considered an economically important commodity, grown for domestic consumption, trade, and it is extensively used in the food industry. However different insects such as Ephestia kuehniella can infest it unshelled almonds during production, storage and other post-harvest processes, which causes quality, quantity, and monetary losses. In order to disinfect almonds without using chemical methods a pilot plant was designed and built for the continuous treatment of unshelled almonds by using microwaves. The plant is equipped with a tubular treatment chamber with internal agitator in which disinfestation takes place in physical way by using five magnetrons of 1.5 kW of power each, operated by PLC. Functional tests were performed on the pilot plant using maximum electrical power (7.5 kW) in order to define and map the operating parameters: specific energy, residence time, mass flow rate and surface temperature, in a ranges of electric motor frequency 30-80 Hz. In order to investigate mortality condition for Ephestia kuehniella in its different stages of life (eggs, 2 days old larvae and 21 days old larvae), an experimental test plan was carried out. Six trial tests were performed seven times for each condition and type of pest with electrical power of 7.5 kW. At the end of the tests, the specific energy to guarantee the total mortality of the three life stages of the insect was determined. Additional tests to decrease electrical power and increasing residence time with costant specific energy value confirmed the totally mortality condition for Ephestia kuehniella in the three stage life

**Audience Take Away:**

- Microwaves technology for pest infestation is an innovative process
- Microwaves treatments is not invasive treatments for conditioning agro-food products
- Dedicated microwaves plant can be projected for specific application
- Microwaves is a physical method of disinfestation that avoids the use of treatments with chemical methods

**Biography**

Antonio Berardi graduated at Politecnico di Bari as Mechanical Engineer in 2009 and Management Engineer in 2010. He received PhD degree in 2015 at University of Foggia - Dept. Sciences of Production, Engineering, Mechanics and Economics Applied to Agro-Zootechnical Systems. Starting from 2015 up to 2021 he collaborates occasionally with University of Foggia and the research group of Prof. Alessandro Leone, participating in research activities in the context of competitive projects and E.R.S.A.F. in order to organize and manage project research. From 2022 he obtained the position of Researcher and published more than 10 research articles in SCI(E) journals

**Jarkko Leppala**
Natural Resources Institute Finland (Luke), Helsinki, Finland

## Holistic risk management on farms

Fasari project in the Natural Resources Institute Finland (Luke) has studied corporate security and holistic risk management in agriculture. In agriculture and the natural resource sector in general, small entrepreneurs strive to manage multiple goals and risks in their work and business. Holistic risk management is based on identifying and managing different sources of risk. The project conducted a survey of agricultural entrepreneurs on farm risks. Farmers need tools and solutions for holistic risk management to meet their business and security goals. The Fasari project risk management tools based on a survey (N=729) on business security and risk management for farmers in Finland. The most important risks among the farmers were associated to production costs, price risks, storm destruction and weather, injury and occupational disease risks. Stress risk on farms was also associated high. A farm risk map tool has been updated and tested in the planning and development of operations. The project will create and test electronic farm risk management program and tools. As a conclusion the barriers in safety culture on farms should be more addressed to meet the future challenges in food production. Adapting to changing internal and external risks on Farms is important in the future for the entire food sector

**Audience Take Away:**

- Constructive research on holistic and systematic risk management on farms
- Using the Farm Risk Map in farm consulting and farm corporate security survey to measure the main risks on farms

**Biography**

Dr. Leppala graduated as MS (Agr) from Helsinki University, Finland in 2000. After graduation he worked for educational planner in Helsinki University one year and then worked for Management Institute of Finland (MIF) couple years. He started to work as research scientist in 2004 for MTT Vakola engineering research and after that MTT Agrifood Finland business and economic research. When MTT Agrifood changed name as Natural Resources Institute Finland (Luke), he continued his research in Luke. He graduated from Aalto University in 2016 as Dr.SC. (tech.) from the field of Industrial Engineering and Management. His dissertation title was Systematic Risk Management on Farms. After this he worked for Scientific Representative in Safety Culture and Risk Management in Agriculture (Sacurima) EU COST Action in 2017-2021. He was nominated as Senior Research Scientist in Luke in year 2021. He has worked for agriculture management, risk management and safety studies over 17 years and published 15 peer revied articles in this field. He is a former football player and after football have been playing drums in a hard rock band in Helsinki

**Solomon W. Newete[1]*, Khaled Abutaleb[2], Katarzyna Dabrowska-Zielinska[2], George J Chirima[1], Radoslaw Gurdak[2], Maciej Bartold[2], Alicja Malinska[2]**

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## Yield prediction of maize crop grown under irrigated and raifed conditions using remote sensing

Maize is considered as a staple food supporting over 200 million people in developing countries. Close to 60% of the cropping area in Southern Africa is planted with maize of which half of it comes from South Africa making the country a prominent supplier of maize in the region. Of the three main provinces where maize is grown in South Africa, the Free State Province accounts for the largest portion (44.3%) of the total 15.8 metric tons produced in the country in 2020/2021 growing season followed by Mpumalanga (22.4%) and North West (17%) provinces. Maize is predominantly cultivated as a rainfed crop in the semi-arid parts of South Africa, where climatic variability has a direct effect on maize production arising from rainfall and temperature variation which results in seasonal shift of crop growing period. Maize irrigation has also been on the rise with 241 000 ha recorded in 2015/2016 growing season. It is projected that the global warming will likely reach 1.8 ?C under low greenhouse gas emission scenario according to the IPCC. Some studies reported a significant increase of temperature by 0.13 °C per decade in the period from 1960 and 2003 in South Africa. The unabated global warming is therefore, increasingly becoming of a great concern for agricultural production with significant yield reduction already reported in the world. For every 1?C increase in global mean temperature, maize production is indicated to decrease by 7.4% and recurring drought incidences and climatic variabilities are often the main factors responsible for the reduction. It is, therefore, important to effectively predict crop yield before harvest to facilitate decision on whether or not to import maize to ensure the national food security as well as to bench mark market prices. The Agricultural Research Council-Natural Resources and Engineering (ARC-NRE) together with the research partners, the Institute for Geodesy and Cartography (IGIK) in Poland investigated the forecast of crop yield using the multi-spectral MODIS satellite data, which consisted of 8-Day L3 Global 250-meter (m) surface reflectance (MOD09Q1) for NDVI estimation as well as the combined Fraction of Photosynthetically Active Radiation (FPAR), and Leaf Area Index (LAI) product (MCD15A3H) with 500-meter spatial resolution (pixel size). Maize yield data for white and yellow maize cultivars was obtained from 5766 maize fields cultivated under rain-fed and irrigation system, in the Free State, Mpumalanga and North West provinces during the 2018/2019 and 2019/2020 growing seasons. The data were statistically analyzed and tested for significant differences among all three provinces and within the two maize varieties. A Random Forest (RF) model was used to predict maize yield using the MODIS satellite data. The results showed that there is a strong correlation between the actual field yield data and the maximum NDVI, LAI and fPAR during the mid-season (November – December) of the maize growing period with a strong to moderate correlation coefficient of 0.8, 0.7 and 0.6, respectively, The Random Forest algorithm was able to predict the yield from the multispectral MODIS satellite data with a high accuracy and R2 value between the predicted and actual yield of 0.85

**Acknowledgement:** This work is based on the research supported wholly by the National Research Foundation of South Africa (Grant Numbers: 118679)

**Cornelis Heemskerk[1]*,Thijs Bouwes[1], Cock Heemskerk[1], Antoon H. Boode[1]**

[1]Robotic Research Group, Inholland University of Applied Sciences, Alkmaar, the Netherlands



## Localization and classification of broccoli heads using deep learning

Fresh market broccoli is traditionally harvested selectively, in a labour-intensive, manual process. Only broccoli heads of the right size and right quality are harvested. The size assessment is done visually by the harvesters. As a first step trying to automate the selective broccoli harvesting process, the presentation describes how we have selected and used a depth camera and neural network to localise and measure the size of the broccoli heads. The first step is to record in the field a series of images, annotate them and then to use a deep learning algorithm to detect broccoli heads in an image. Using a customized data set, based on the existing University of Lincoln broccoli dataset, we trained and compared the performance of two modern deep learning algorithms (YOLO V4 and YOLACT). In a comparison between five different depth cameras, we selected the Intel Realsense stereo camera D435I as the most suitable for our purpose to perceive a broccoli in the field. After training on a custom data set, YOLO was found to have an Average Precision (AP) score of 70.48%, and a run-time performance of object detection within 32 ms. YOLACT was found to be better at accurately identifying and locating the broccoli head (AP score of 73.82%), however, YOLACT performs slower with a detection time of 51 ms. A user interface was developed to display all detection information in real time. With the help of a class diagram, we will present an object-oriented overview of the proof-of-concept system and a sequence diagram to show how the objects work together.With a subsequent field experiment, the recognition algorithm was tested on 50 new broccoli heads, which were scanned and measured to establish the ground truth in diameter and depth. During the field experiment it was shown that the diameter measurement is accurate to 9.36 mm and the depth measurement to 8.98 mm. In further work towards a machine that can selectively harvest broccoli, we will study how the vision system can be integrated with a harvesting arm to harvest broccoli in the field

**Audience Take Away:**

- How modern vision technology can be applied in an agricultural context
- How to train and measure the performance of neural networks in an application like broccoli harvesting
- Plans for follow on work towards fully automated selective harvesting
- Plans for follow-on work in growth monitoring and disease detection

**Biography**

Dr. Heemskerk studied mechanical engineering at the Delft University of Technology (MSc 1985), and researched assembly with industrial robots (PhD 1990). During 1985-1986 he was a visiting scientist at the Robotics Institute of Carnegie Mellon University, Pittsburgh, PA, USA. Dr. Heemskerk is one of the main designers of the European Robotic Arm (ERA). The space robot was launched to ISS in 2021. In 2007, Dr. Heemskerk founded Heemskerk Innovative Technology, and has worked as robotics expert on many different projects. Since 2016, dr. Heemskerk is a professor in Robotics at Inholland University of Applied Sciences, working on Smart Farming

**Inga Muizniece[1]* and Daina Kairisa[1]**

[1]Faculty of Agriculture, Institute of Animal Sciences, Latvia University of Life Sciences and Technologies, Jelgava, Latvia



## Slaughter results and pH of Limousin bulls and heifers

The objective of the study was to assess the impact of sex on the slaughter results and pH of Limousin pure breed bulls and heifers. The study analysed data of 46 bulls and 79 heifers fattened on different farms in Latvia and Lithuania as part of the Baltic Grassland Beef project and slaughtered between 2018 and 2020, in the slaughterhouse "Agaras" in Lithuania. The average age of the animals at the time of slaughter was 17 months for bulls and 19 months for heifers ($p \leq 0.05$), with the average live weight being 526.0 kg and 521.8 kg respectively. Bulls produced heavier carcasses, with cold carcass weight being on average 305.13 kg, which was 8.03 kg more than the outcome from heifers ($p \leq 0.05$). Bulls also showed better outcomes for the dressing percentage and conformation, with 58.04% dressing percentage, and 3.74 points for conformation (74% U, 26% R). Dressing percentage for heifers was 56.93%, and conformation evaluation was 3.44 points (46% U, 53% R, 1% O). Conformation evaluation differ substantially between both groups ($p \leq 0.05$). Carcasses of heifers were more predominantly evaluated in the 3rd fat class, with the average evaluation being 2.94 points, while carcasses of bulls predominantly were ranked in the 2nd fat class, with the average evaluation being 2.13 points ($p \leq 0.05$). The average pH for heifer carcasses was 5.65, but for bulls it was 5.87, thus exceeding the preferred pH threshold of 5.8. The results of the study lead to a conclusion that Limousine bulls are quicker to achieve higher live weight and cold carcass weight, better dressing percentage and conformation results, compared to heifers. Heifers have slower growth parameters, but their carcases are characterised with better fatness and lower pH, two important parameters in the quality of meat. The study has been implemented as part of ESF project 8.2.2.0/20/I/001 "Transfer of Latvia University of Life Sciences and Technologies to a new financing model for its doctoral studies program"

**Audience Take Away:**

- Scientific research in beef production should focus on the study of productive traits, and be looked at in combination with the quality of the product obtained
- Sex has an impact on both productive and qualitative traits and should be taken into account when organising research
- Traits such as pre-slaughter live weight, slaughter weight, slaughter yield, and EUROP carcass class are important parameters for breeders and processors. Another important parameter that determines the quality of the meat is pH
- Knowledge of the influence of sex on the results of slaughtering cattle and the quality of meat provides the producer with options for making good decisions in achieving a quality product

**Biography**

Inga Muizniece began her studies at the Latvia University of Life Sciences and Technologies in 1999. In 2003, she earned a bachelor degree, and in 2005, a master's in agricultural sciences. The study is related to fattening and meat production in meat cattle breeds. Currently, a doctoral thesis is being prepared on the topic of 'Scientific basis for quality beef carcasses and meat production'. Inga Muižniece works as a researcher at the Faculty of Agriculture of the Latvia University of Life Sciences and Technologies, participating in various scientific projects. She has prepared publications of various levels, including those published in SCOPUS

**Pello Alfonso Muniozguren*, Idoia Unzueta**
Fundacion Sustalde, Erandio, Spain



## Smart farming tools for the enhancement of irrigation efficiency in The Gambia: A case study

In countries such as The Gambia, agriculture has a large role to play in reducing poverty. To that end, irrigation smart practices can be considered a contemporary and ecologically sustainable agricultural production system that supports the development of a water efficient economy and generates a high environmental, economic and social return. The informal irrigation sector in The Gambia, as in many other West African countries, is characterised by limited knowledge and skills in irrigation techniques, and lack of sufficient support services from extension agents and other advisory systems so as to realise its full potential. The high dependency on rainfall, weak policy environment, low levels of technology adoption, low private sector investment, and poor infrastructure are the main factors that result in low agricultural productivity. Increasing the availability of water to the agricultural sector is critical to improving agricultural productivity and transforming the sector to be more commercially and market oriented. This will help to meet the needs of the domestic and the tourism market, and make The Gambia less dependent on imported food. Considering the above, the current project in The Gambia targets a digital, lower-cost, easier-to-maintain Irrigation Advisory System (IAS), which is more adapted to the requirements and capacities of the agricultural target groups and greatly increases chances of sustainability and replicability in West Africa. The presentation will address ongoing project activities carried out in The Gambia addressed to smallholders and local stakeholders on efficient water management for irrigation. Fundación Sustalde is working closely with the National Agricultural Research Institute of The Gambia (NARI) to adapt and implement an IAS based on the calculation of evapotranspiration according to the FAO56 water balance model. For that, weather data is collected from meteorological stations. The IAS automatically processes meteorological data collected by the meteorological stations, and together with crop data, soil type and irrigation system, calculates the daily evapotranspiration of the crops. Based on this calculation, the IAS estimates the specific water needs of each crop and plot, and sends personalised irrigation recommendations to farmers registered. The IAS developed consists of a multi-language web platform that has a functionality for sending notifications via email and SMS to deliver irrigation recommendations to end users. So far, the IAS has been implemented in 14 farms and vegetable gardens in two cropping cycles in The Gambia, significantly reducing crop water requirements and increasing crop productivity.

**Audience Take Away:**

- The IAS: A cost-effective and easy-to-implement irrigation advisory system
- The IAS is specific for a wide range of crops and types of soil adapted to local characteristics
- The IAS provides personalised irrigation recommendations via email and SMS directly to farmers
- Following irrigation recommendations, a significant reduction of irrigation water is achieved while increasing crop productivity

**Biography**

Dr Alfonso-Muniozguren studied MSc in Mining and Energy Engineering at the University of the Basque Country and the University of León, Spain, with exchange studies at Montanuniversität Leoben, Austria. He then spent a year at The Netherland Organisation for Applied Scientific Research (TNO) to later start his PhD studies in the Chemical Engineering Department (CPE) at the University of Surrey (UoS), UK, on water treatment and reutilisation via advanced oxidation processes. After earning his PhD in 2020, he worked as a postdoctoral researcher in the CPE, as well as in the Civil and Environmental Engineering Department at the UoS on applied projects in Colombia and Philippines. After a year as a postdoctoral researcher, he joined Fundación Sustalde in 2021 as a project manager

**Gideon Danso-Abbeam[1]*, Abiodun A. Ogundeji[1], Ogunleye Oluwasola[2]**

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## Enhancing Food Security through Home Food Gardening in Lesotho

Home gardens are gaining attention as a way to boost food production and income, especially in impoverished areas. As a result, additional empirical evidence is needed to inform policy guidelines aimed at tackling food insecurity and poverty through Home Food Gardens (HFG). After correcting for differences in household demographics, this study examined the impact of HFG adoption on household food security status. The study relies on the data collected from 2,014 households between November 2017 and January 2019 by Lesotho's Child Grant Programme (CGP) and Sustainable Poverty Reduction through Income, Nutrition, and access to Government Services (SPRING) project impact evaluation. This study employed the Food Insecurity Experience Scale (FIES), an experience measure of food access based on responses to an 8-item questionnaire that assesses conditions and behaviours resulting from a person's inability to obtain food due to a lack of economic or other resources. FIES evaluates the degree of a person's inability to access the food required to live a healthy, active, and dignified life. The empirical methodology considers probable causation between the adoption of HFG and household food security by addressing selection biases that may arise from both observed and unobserved household factors by using an endogenous treatment effects estimator with ordered outcomes. According to FIES data, 27.8 percent of Lesotho households are food secure, 26.3 percent are moderately food insecure, and 45.8 percent are severely food insecure. Adoption of HFG is also influenced by factors such as educational attainment, agricultural land area for crop cultivation, possession of information gadgets (e.g., television, radio, and mobile phones), and participation in non-farm businesses. Furthermore, our empirical findings show that adopting HFG results in a 31.69 percent chance of households achieving food security status and a 48 percent likelihood of households minimizing severe food security. Our findings reaffirm HFG's contributions to improving and strengthening sustainable local food systems to address food insecurity concerns, particularly in developing countries such as Lesotho. As a result, governments and development organizations should prioritize food-insecure households when developing measures to encourage the use of HFG.

**Audience Take Away:**

- Relevant empirical evidence from a reliable data set and methodological techniques can serve as a guide for poverty and food insecurity stricken intervention programs such as HFG. Hence, development practitioners can have a guide when designing and implementing projects in developing economies
- The study used a novel econometric technique that can be learnt by econometric teachers and students to improve their future research and teaching
- The study also add to inadequate literature on a more recent measure of food security (FIES) agreed on by major international organizations such as Food and Agriculture Organization (FAO) and World Food Program (WFP), which is critical to students, teachers and development practitioners

**Biography**

Gideon Danso-Abbeam (PhD) is an agricultural economist with over nine years of professional experience in teaching, research, and community service for higher learning and development organizations. Gideon currently lecturers at the University for Development Studies, Ghana, and postdoctoral research fellow at the Disaster Management Training and Education Centre, University of the Free State, South Africa. His primary research interests are production economics, impact evaluation, food security analysis, and gender analysis. Gideon's research has mostly relied on farm-level household surveys and micro-econometric analysis with econometric tools like STATA and SPSS. He has published many articles in international journals

**Elias Militao[1]*, Elsa Salvador[2], Olalekan Uthman[3], Stig Vinberg[1], Gloria Macassa[1]**

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[3]Warwick Centre for Global Health, Division of Health Sciences, Warwick Medical School, University of Warwick, Coventry CV4 7AL, UK

## Coping Strategies in Situations of Household Food Insecurity in Greater Maputo, Mozambique: a qualitative study

Food insecurity (FI) is a living reality for many households in low- and middle-income countries, especially among the most vulnerable groups. In Mozambique, the burden of household FI and how various coping strategies might be associated with negative health outcomes is unknown. This study aimed to investigate the experiences and coping strategies used by food insecure households and their perceived health outcomes. Accordingly, 16 in-depth interviews were performed and audio-recorded and transcribed verbatim. Thematic analysis was employed and 5 themes were generated. A wide-range in experiences and coping strategies was reported with focus on skipping meals, eating unsafe and low quality foods, having less nutritious monotonous diet, reducing and re-allocating food intake, reducing meal preparation costs, sending children to relatives and selling household appliances and furniture. Furthermore, the respondents experienced emotional distress, poor academic performance, anxiety and depression, substance use, hypertension, type 2 diabetes, increased risk for HIV/AIDS acquisition and other perceived health outcomes. These findings suggest the need for employment creation and women empowerment as well as implementation of appropriate policies and health programs designed to alleviate household food insecurity.

**Rajesh Mehrotra*, Pinky and Sandhya Mehrotra**

Department of Biological Sciences, Birla Institue of Technology and Sciences, Goa, India

## AtAVT6 family of amino acid transporters of Arabidopsis thaliana as target for Crop Improvement

Plants are exposed to several biotic and abiotic stresses, which greatly affect their growth and productivity. To meet the global food requirements, there is an urgency to develop plants that can survive under these environmental stresses with high yield and available land resources. Recent studies suggest that amino acid transporters can potentially enhance crop yield, nutrient value, and stress resistance. The function of ATVT6 amino acid transporter family in plants remains unexplored. The present study investigates the expression patterns of AtAVT6 genes in different tissues and under various abiotic stress conditions using quantitative Real-time PCR. The expression analysis demonstrated that the member AtAVT6D was significantly induced in response to phytohormone ABA and stresses like osmotic and drought. The tissue-specific expression analysis showed that AtAVT6D was strongly expressed in the siliques. Taking together these results, suggests that AtAVT6D might play a vital role in silique development and abiotic stress tolerance Additionally, transient expression studies were performed with the full-length AtAVT6D promoter and its deletion constructs to study the effect of ACGT-N24-ACGT motifs on the reporter gene expression in response to abiotic stresses and ABA treatment. The fluorometric GUS analyses revealed that the promoter deletion construct-2 (Pro.C2) possessing a single copy of ACGT-N24-ACGT motif directed the strongest GUS expression under all the abiotic conditions tested. These results suggest that Pro.C2 can be used as a stress-inducible promoter to drive a significant transgene expression.

(i)Amino acid transporters as target for crop improvements

(ii)Role of ATAVT6 in stress tolerance

(iii)Promoter architecture of ATAVT6D

**Biography**

Prof Rajesh Mehrotra is in Department of Biological Sciences at K K Birla Goa campus and also associate dean for international Programs and collaboration division. He did his PhD from National Botanical Research Institute, Lucknow India and was a postdoc fellow at Kyoto University ,Japan. He has published more than sixty international peer reviewed research articles. He has handled eight research Grants. He is a recipient of Indian National Science Academy Bilateral exchange award to visit University of Edinburgh. He has visiting assignments to OIST, Japan, Louisiana state university USA.

**Poonam Malakondaiah[1]*, Sri Kakani Govardhan Reddy[2], Sri C. Hari Kiran[3]**

[1]Chief Commissioner, RBKs & Spl Chief Secretary to Government, Agri & Co-Op Dept and Animal Husbandry, Dairy Development & Fisheries Dept, (Food Processing & Sugar) Industries and Commerce Dept (FAC), Andhra Pradesh, Guntur, India

[2]Hon'ble Minister for Agriculture, Cooperation, Marketing & Food Processing, Agri & Co-Op Dept, Guntur, Andhra Pradesh, India

[3]Spl. Commissioner of Agriculture, Dept of Agriculture, Guntur, Andhra Pradesh, India

## Rythu Bharosa Kendralu (RBKs – Farmer Facilitation Centers) – A Digital & Integrated Model for Knowledge & Service Delivery to Farmers towards Sustainable Agriculture – A Unique Initiative in the State of Andhra Pradesh, India

Andhra Pradesh being an Agrarian State, the Government primarily focuses on Agriculture & allied sectors and Farmer's Welfare. The Hon'ble Chief Minister has envisioned on establishing an Agri Input Shop and a Village Knowledge center at every Village in the state inorder to deliver quality input supply and latest technology knowhow to farmers at their doorstep. This vision is grounded in the name "Rythu Bharosa Kendram" (RBK)- literal meaning of which in State Language Telugu is ' Farmer assurance centre'. On May 30th 2020 Govt inaugurated 10778 RBKs. Rythu Bharosa Kendram is One Stop Shop for supply of Government Certified Agri Inputs (Seeds, Fertilizers & Pesticides), Animal Husbandry & Fisheries Inputs to the farmers and Farmer Knowledge Center for giving scientific Agri Advisories to the farmers. RBKs make available quality Agri inputs, farm implements and fish feed etc., to farmers at right price, right time at their Village Secretariats. This initiative reduce duplicate and spurious products sale in market by allowing sale of only tested and certified products through Govt Agri Input Shops. The farmers are technically empowered at RBKs through practical training programmes viz Dr YSR Polambadi, YSR Thotabadi, Pasu Vignana badi, Matyasagu badi (Badi means school)and latest technical knowledge being disseminated through monthly magazine called "Dr.YSR Rythu Bharosa Magazine" and District Resource Centers (Dept & University Scientists). Audio Visual Aids, Mini Soil testing Lab, Method demonstrations, Library etc are part of RBKs. The RBKs act as interface between Farmers and Scientists and Extension staff of Agriculture. RBKs act as single point of contact for information about latest technologies, Govt. schemes etc. A database of Farmers in RBK jurisdiction with details of land extent, crops grown, livestock details etc is maintained by RBK Staff. RBKs are also functioning as Procurement centers at farm gate. RBK Advisory Boards are established at State, District, Mandal and RBK level to guide on various farming issues. Farmers are made as part of decision making through these Agri Advisory Boards. AABs facilitated bottom to top approach to form policy decision making as required by the farming community. Social Audit is a Unique Feature in RBKs. Government Welfare Schemes Beneficiary lists are displayed at RBKs to bring transparency in the system. Social Audit facilitate extending benefits to Right person only. The farmers are being given advisories on welfare schemes and technical queries through RBK Call Center 155251. About 64 Qualified Executives are engaged in Integrated Call Center (ICC). The RBK is an innovative and comprehensive approach and is a Game Changer for farmers which strengthens Agriculture Extension System in collaboration with all the line departments like Agriculture, Horticulture, Sericulture, Veterinary, Fisheries, Cooperation, Irrigation etc to deliver the services to the farmers from a single platform

**Audience Take Away:**

- Integrated Approach in Agriculture sector where Seed to Sale activities are taken up at Village Level. Effective use of Digital Tools for Information and Knowledge Dissemination
- Pretested & Certified Inputs sale at Villages and taking all Government services to Villages, Social Audit of all Govt. Scheme Beneficiaries to extend benefits to right persons

- To take up Policy Decision to integrate services at village level, Digital tools were used effectively to reach farmers
- Production cost can be reduced through supply of quality inputs, Procurement of Agril. & allied produce at Minimum Support Price (MSP) through RBKs will fetch remunerative price when there are price fluctuations in the open market

**Biography**

Smt Poonam Malakondaiah is post graduate in Agriculture with specialization in Micro Biology from Indian Agriculture Research Institute, New Delhi and is Gold Medalist. She joined into Indian Administrative Service in 1988 and served to the country in various cadres viz., District Collector, HoD of various depts Agriculture, Civil Supplies, Panchayat Raj & Rural Development, Health & Family welfare. Presently working as Chief Commissioner (RBKs) & Spl Chief Secretary to Government (Agri & Co-Op Dept . She was awarded "Akshara Deeksha" (Literacy goal) by Prime Minister for her exemplary service in women literacy programme

# KEYNOTE FORUM

## DAY 03

2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

01-03 SEPT

**J. C. Tarafdar**

Former UGC Emeritus Professor & ICAR Emeritus Scientist, Jodhpur 342008, Rajasthan, India

# Nanofertilizers: Future for Global Food Production

Different nanofertilizers can be synthesized through physical, chemical, aerosol and biological means to enhance plant productivity, nutrient use efficiency, stress management, soil health management and environmental protection. Results showed that nano-nutrients application in agriculture may serve as an opportunity to achieve sustainability towards global food production. Important benefits of nanonutrients over conventional chemical fertilizers rely on nutrient delivery system. For example, nutrient can be released over 40-50 days in a slow-release fashion rather than 4-10 days by the conventional fertilizers. The nutrient use efficiency also improved by 2-20 times, therefore, nutrient requirements is less as well as reduces the need for transportation and application costs. Moreover, by using small quantities soil does not get loaded with salts that usually are prone to over application using conventional fertilizer. Nanonutrients also can be used as nanobioformulations. The formulations containing one or more beneficial microorganisms after blending of required nanoparticles to enhance soil productivity. Nanobioformulations can be helpful to enhance the stability of biofertilizers with respect to desiccation, heat and UV inactivation. It can also solve some limitations of biofertilizers such as ease to handling, enhanced stability, protection against oxidation, retention of volatile ingredients, taste making, consecutive delivery of multiple active ingredients etc. In general, plant nutrient as nano-size mobilizes 30% more native nutrient than conventional fertilizer application. The average improvement of yield, irrespective of crops and soil types, varies between 24-32% as compared to 12-18% under chemical fertilizers. Nanomaterial, with a particle size less than 100 nm, influences key life events of the plants that include seed germination, seedling vigor, root initiation, stress management, growth and photosynthesis to flowering. Additionally, nanonutrient have been implicated in the protection of plants against oxidative stress as they mimic the role of antioxidative enzymes such as superoxide dismutase (SOD), catalase (CAT) and peroxidase (POX). But in spite of all these, nanofertilizers and nanobioformulations should be applied as recommended doses; because at higher rate of application have been proved to be phytotoxicity as they enhance the generation of reactive oxygen species (ROS). The elevated level of ROS may damage the cellular membranes, proteins and nucleic acids. The uptake rate of nanonutrients by plants also depends on their shape and sizes. In general, small sizes of nanoparticles can be penetrating through the cuticle while larger nanoparticles can penetrate through cuticle-free areas such as hydathodes, the stigma of flowers and stomata. Nanonutrients may be applied both on soils and on leaves as foliar. This can also be applied through drip, hydroponic, aqua and aeroponic. With recommended doses of application, it can be envisaged to become major economic driving force and benefit consumer and farmers with no detrimental effect on the ecosystem

**Biography**

Dr. J. C. Tarafdar did his M. Sc. and Ph. D. degrees in Soil Science and Agricultural Chemistry from Indian Agricultural Research Institute, New Delhi and Post Doctorate from Institute of Agricultural Chemistry, Goettingen, Germany. He has made original and well recognized contribution on mobilization of native phosphorus. He has successfully developed biosynthesized nano nutrients and nano induced polysaccharide powder for agricultural use. He has published 368 research articles in national and international journals which include 38 book chapters and four books. He has four patents and 73 new organisms in his credit.


## Soumen Bhattacharjee

UGC Centre for Advanced Study, Plant Physiology & Biochemistry Research laboratory Department of Botany, The University of Burdwan, West Bengal, India


# Exploring strategies of Redox Biology in in developing climate resilient crops

Of late agricultural productivity across the globe has been driven by overwhelming limitations imposed by fluctuating environmental stress caused by climate change. A central common theme among environmental stresses is serious impact on redox biology and the perturbation of the redox homeostasis in crop plants. Crops exploit an elaborate redox system for responding to environmental fluctuations and acclimation. Redox Biology offers insights into the formation of ROS, its detox scavenging, sensing, role in oxidative deterioration, and signalling associated with redox-regulatory physiological processes of plant. ROS-antioxidant interaction at metabolic interface found to regulate cellular redox cue, metabolism, development, differentiation, stress signaling, interactions with other growth factors, systemic responses in crops. Crop plants are equipped with antioxidative defence systems not only to combat enhanced level of ROS, but also to tightly regulate the endogenous concentration necessary for controlling various events of Plant Biology. The ROS wave which is a consequence of perception of unfavourable environmental cues, thought to be integrated with additional metabolic/signalling pathways to enable rapid systemic acclimation of organisms. In recent times, as an approach to engineer climate resilient crops, many strategies have been used to explore the positive signalling role of ROS while restricting their negative impact on crop system biology. The presentation will try to illustrate the physicochemical basis of the production of ROS, under normal and unfavourable environmental conditions, their sensing mechanisms, with an added effort to understand their implication associated with stress tolerance and signalling and existing redox-based strategies to improve crop performance under stress. Further, glimpses of the work my laboratory will be presented to discuss the central role of internal redox cue under abiotic stress as determinant of oxidative stress response, emphasizing how redox cue has opened up new avenues to exploit redox biology for crop improvement required for sustainable food security

**Biography**

Soumen Bhattacharjee, presently Professor & Coordinator, UGC Centre for Advanced Studies, Department of Botany, the University of Burdwan, West Bengal, India has working academic and research experience of almost two and half decade, Dr Bhattacharjee joined Indian Council of Agricultural Research (ICAR) as Senior Scientist of Plant physiology. In 2013 he joined the University of Burdwan as Professor and Head of the Department of Botany, He is also a member of European Society of Free Radical Biology. He has published 135 research papers in various international and national peer reviewed journals, and edited volumes. He has also edited two books in Springer International, and written 01 monograph in Springer Nature. He has citation of more than 2800 with H-index and I10 index 23 and 40 respectively

**Krishan Kant Tyagi**

Former Principal Scientist, ICAR-IASRI*, New Delhi, India

# Estimation of Area, Yield and Production of Food Grain Crops in India - On Some Aspects of Adequacy of the Sample Sizes at different Stages of Sampling

India is a vast agrarian country having geographical area of 329 million hectares. It is divided into 28 States and 08 Union Territories (UTs are administered by the President through an Administrator appointed by him/her). These comprise of 750 Districts and a total of 628,221 Villages. Around 70 per cent of India's population (around 1.360 billion) lives in Villages. There are good number of food grain crops and non-food grain crops grown during the entire Agricultural Year (01 July to 30 June of subsequent year). An Agriculture Year is divided broadly into three seasons, namely Kharif (July-October), Rabi (November-April), Summer (May-June). For effective planning concerning arranging feeding the vast population of human and livestock, the estimation of total production of food grains and non-food grains is of paramount importance. In India, the estimation of yield rates of food grain crops is done on the basis of crop cutting experiments (CCEs) conducted in majority of States/UTs under the National Programme of Crop Estimation Survey (CES). At district level, the sampling design adopted usually is stratified multi stage random sampling. Presently, around ninetyfive per cent of the total food grains production is estimated on the basis of yield rates obtained from these CCEs conducted on scientific basis spread over various States/UTs. Around more than one million CCEs (of different sizes and shapes) are conducted covering 52 food crops and 16 non-food crops. The conduct of such a large number of CCEs had been in question since long. Accordingly, a high powered committee constituted by Ministry of Agriculture & Farmers Welfare (MoAFW), Government of India (GoI), has recommended for reducing the sample sizes at different stages of sampling, which is highly being criticized and debated. In India, the Directorate of Economics and Statistics (DES) under Department of Agriculture & Cooperation (DAC), MoAFW, GoI, releases estimates of area, yield and production of main food grain crops, oilseeds, sugarcane, fibers and important commercial and horticulture crops. These crops together account for nearly eightyseven per cent of the total output of agriculture. The estimates of crop production are obtained by multiplication of area estimates by corresponding yield estimates. Therefore, the estimates of area and yield rates assume immense importance in the entire gamut of agricultural statistics. The need for timely, reliable and comprehensive statistics on area, yield and production of crops assumes special significance in view of the vital role played by the agriculture sector in the Indian Economy. The primary responsibility for collection of statistics of land use and area under crops following prescribed procedures rests with the various State Departments. The yield rates of principal crops are estimated through General Crop Estimation Survey (GCES) conducted by State agencies following scientific techniques of random sampling. Field Operations Division (FOD) of the National Sample Survey Office (NSSO) under the Ministry of Statistics and Programme Implementation (MoSPI), GoI has the overall responsibility for providing technical guidance to States/UTs in developing suitable survey techniques for obtaining reliable estimates, assistance in training of staff and exercising supervision. Under the Improvement of Crop Statistics (ICS) Scheme which was taken up during 1973-74 with the objective of locating, through the joint efforts of NSSO and State Governments, the deficiencies in the system of crop statistics by exercising technical supervision over the primary field work and suggesting remedial measures for improving the system. To achieve this, sample checks on area enumeration, and area aggregation are carried out in a sample of about 10,000 villages in each season and on conduct of around 31,000 CCEs during an agricultural year. Data pertaining to CCEs for different crops, having smaller sample sizes, pertaining to good number of States under

ICS scheme obtained from NSSO was statistically analysed. Estimates of average yield pertaining to various food grain crops along with estimates of their percentage standard errors were worked out. It was observed that estimates of average yield for the two major crops viz. wheat and paddy have been obtained with suitable degree of precision, however, for minor crops like maize, barley, jowar, ragi etc., these were obtained with higher percentage standard errors. Sample sizes at the primary stage of sampling i.e. Villages have been worked out for estimation of average yield of different crops for different levels of margin of errors. Data pertaining to area for different crops pertaining to different districts (20 survey numbers in a village) of some States under ICS scheme were obtained from NSSO and analysed. Estimates of total area under different crops were obtained with estimates of very high percentage standard errors. However, these have also been worked out, had the sample size would have been increased from 20 survey numbers to 100 survey numbers. In that case, the percentage standard errors decreased significantly for number of crops. The main finding in this study was that on the basis of smaller sample sizes, the estimates of average yields of two major crops i.e. paddy and wheat may be estimated with suitable degree of precision in those States in which these crops are being grown as major crop. However, for other crops, these sample sizes may not be adequate for estimating the average yields of these crops with suitable degree of precision. For estimating these with permissible margin of errors, the sample sizes for these crops would have to be increased suitably

# SPEAKERS

## DAY 03

2ND EDITION GLOBAL CONFERENCE ON

# AGRICULTURE AND HORTICULTURE

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**Zohreh Nasimi[1]*, Aiping Zheng[1], Zhang Wenqing[1]**

[1]Agronomy College, Sichuan Agricultural University, Chengdu, Sichuan, China

## Perspective of using Burkholderia species in Agriculture: Is it Friend or enemy?

Burkholderia cepacia complex (BCC) is a group with high genetic versatility and adaptability. It contains at least 90 valid species belonging to the subphylum of β-proteobacteria, gram-negative bacilli ubiquitous bacteria in a wide range of niches. We isolated three Burkholderia species with different interactions with the rice plant as the host plant. Burkholderia vietnamiensis strain J14Eple2 (accession number: SAMN24971778) has plant growth-promoting properties and antimicrobial activities against Rhizoctonia solani AG1IA, the causal agent of rice sheath blight. While B. cepacia strain J14Eple (accession number: SAMN24971777) and B. gladioli strain A12Epstem have pathogenicity properties, and they can induce a Hypersensitive response in tobacco leaves. The complete genome of B. vietnamiensis strain J14Eple2 and two pathogenic Burkholderia species, including B. cepacia strain J14Eple and B. gladioli strain A12Epstem isolated from rice, was sequenced, analyzed, and annotated to find B. vietnamiensis strain J14Eple2 potential virulence, the gene regions related to virulence, antibiotic resistance and antibiotic production, were compared between non-pathogenic B. vietnamiensis strain J14Eple2 and two pathogenic Burkholderia species, including B. cepacia strain J14Eple and B. gladioli strain A12Epstem. The genomic analyses reveal that non-pathogenic B. vietnamiensis strain J14Eple2 habor genes are encoding occidiofungin that has excellent potential for developing biopesticides and pharmaceutical drugs while not detected in pathogenic Burkholderia species. In the Non-pathogenic B. vietnamiensis strain J14Eple2, 12 Genomic Islands were identified, while the pathogenic B. cepacia strain J14Eple and B. gladioli strain was found A12Epstem 14 and 19 GIs identified. For examining the ability of B. vietnamiensis strain J14Eple2 in pathogenicity in mammalian and opportunistic infections in cystic fibrosis patients, we searched in the genome of B. vietnamiensis strain J14Eple2 to find essential virulence factors such as Cable pili, 22-kilodalton adhesion biosynthesis genes, SodC gene, zink metalloprotease, melanin pigment, VgrG-5 protein. We found B. vietnamiensis strain J14Eple2 does not harbor genes of essential virulence factors such as encoding Cable pili and VgrG-5 protein. Nevertheless, it has some genes encoding CF-related O-antigen biosynthesis. Our result suggests that regardless of strong antimicrobial activity and plant growth-promoting features of B. vietnamiensis strain J14Eple2, It is better to avoid direct use in Agriculture. However, B. vietnamiensis strain J14Eple2 has Quorum quenching potential and can be used to produce QQ molecules

**Audience Take Away:**

- The knowledgeable audience in plant disease management is familiar with the necessity of reducing fungicides and pesticides in the control of pathogens and pests
- The safety of biocontrol agents is a critical issue their face. This research focused on the safety of one of the biocontrol agents. It helped the audience get apparent aspects of the safety and unsafety of one biocontrol agent, which can help them choose to apply bio-pesticide or bio-fungicides
- The result of this research would be practical for other researchers in this field because Burkholderia has a wide range of hosts and can grow in a variety of environments, so it is probably to collect by other researchers

**Biography**

Dr. Nasimi studied Plant Pathology-Mycology at the Shiraz University, Iran and graduated as MS in 2015. She then joined the research group of Prof. Taheri at Plant Pathology department, Ferdowsi University of Mashhad and she received her PhD degree in 2019. Then she joined the research group of Prof. Zheng, as a postdoctoral researcher and lecturer, rice research institute and agronomy college, Sichuan Agricultural University. She has published six research articles in SCI(E) journals

**Bartłomiej Glina**

Department of Soil Science and Microbiology, Poznan University of Life Sciences, Poland

## Paludiculture as a win-win option for future agriculture use of peatlands

Peatland soils are the most carbon-rich soils in the world, storing ca. 600 Gt of carbon. However, recent human activity and observed climate change have transformed these ecosystems from long-term carbon sinks into carbon sources, thus altering global carbon cycling. The use of peatlands for agriculture is connected with drainage, which lowered the water table and make these ecosystems more suitable for cultivation. In Central and Western Europe, up to 90% of peatlands have been exploited for agriculture which may have led to peat subsidence and release of GHGs to the atmosphere, what together affects the carbon pools depletion. Thus, in view of the recent international agreements on climate action, the wise use of peatlands (including restoration activity) is of crucial importance. Therefore, future agriculture on peatlands must apply climate smart activity which maintains low carbon emission by maintaining high water level. One of the recently discuss method for sustainable peatland management practices is paludiculture, especially in the context of re-used of degraded peatland ecosystems. Paludiculture, as generally been defined is using biomass from wet and rewetted peatlands under conditions that maintains the peat body, facilitate peat accumulation of organic matter and provide the ecosystem services associated to natural peatlands. This method allow to produce biomass from rewetted peatlands under conditions that maintain the peat body, sustain peatland ecosystem services, and encourage carbon accumulation. However, rewetted peat soils are less suitable for agriculture and dairy farming, as common agricultural crops are not adapted to such wet conditions and the limited load-bearing capacity of wet peat soils restricts their accessibility for agricultural machinery. The aim of this review study is to assess the effect and potential benefits of paludiculture and peatlands restoration in climate change mitigation. Additionally, the adaptation and bottlenecks for the development of paludiculture in food crops in temperate climate zone will be discussed

**Audience Take Away:**

- The role of peatlands in climate change mitigation
- The environmental friendly method of agricultural peatland use
- Technical and environmental limitations for paludiculture
- Promising paludicrop species

**Biography**

Dr.Bartłomiej Glina studied Environmental Protection at the Wroclaw University of Life Sciences, Poland and graduated as MS in 2010. He then joined the research group of Prof. Cezary Kabała at the Institute of Soil Science and Environmental Protection, Wrocław, Poland and received his PhD degree in 2014 at the same institution. The he obtained the position of an Associate Professor at the Department of Soil Science and Microbiology, Poznań University of Life Sciences, Poland. He has published more than 40 research articles, mainly related to soil/environment interactions, with special focus on peatland ecosystems

**Lucrecia Valentine**
Cape Peninsula University of Technology, Cape Town, South Africa

## Key competitiveness and quality requirements for successful small fresh produce farmers in emerging countries (South Africa)

Boosting the growth of small farmers serve as a meaningful mechanism in uplifting rural food shortages in many developing countries, including South Africa. Small and Medium-sized Enterprises (SMEs) contribute significantly to the economic growth and development of a country (Taiwo, Awolaja, & Yusuf, 2012:18). Wiggins (2009:4), defines small scale farming as; "…practices that engage farmers with substantial knowledge of agriculture and cultivating small plots effectively". Baporikar, Nambira and Gomxos (2016:195), are of the opinion that SMEs have to conquer many barriers that deter the growth of their businesses. These include planning methods to access finances and marketing strategies, the use technology in monitoring business operations, customer service advancement, as well as providing assurance to the customer that will increase business image and reputation. This presentation aims to elaborate on key competitiveness and quality requirements for successful small fresh produce farmers. The development and subsequent application of a Quality Management approach in SMEs are limited by factors such as the absence of time and resources (human and financial), the extreme costs of implementation and the lack of knowledge and experience (Aggelogiannopoulos, Drosinos, & Athanasopoulos, 2007:1077; Mondelaers & Van Huylenbroeck, 2008:474; and Karipidis, Athanassiadis, Aggelopoulos, & Giompliakis, 2009:93). Quality Management (QM) has grown into a domestic strategy for most of the countries around the globe and is gaining recognition at an accelerated pace (Asim & Zaki, 2012:14-24). Globally, the prominence of quality management is appreciated and embraced as a proven technique that guarantees the survival of many successful organizations. The commitment to managing quality is influenced by increasing globalization, which necessitates discussions on various approaches and practices that will serve as quality barometers within various countries and regions (Foster 2017:74). Asim and Zaki (2012:14-24), maintain that QM has key technical, economical and human implications, which influence the competitiveness, employment, exports and overall economic growth of any country. The safety of fresh produce is of vital importance to several interested parties like consumers, producers, traders, processing firm and governments. Especially since more and more of the global population are moving towards consuming fresh produce 'raw', due to its health benefits owing to its vitamin, mineral, fibre and antioxidant properties, it is the opinion of this researcher that fresh produce farmers need to be particularly considerate when applying crop protection applications during their farming practices, in order to deem their harvested crops safe for human consumption. Developing countries have seen an upsurge in the awareness about nutritional, safety and quality aspects in their food preference as a result of a general escalation in health consciousness and mindfulness of the advantages of fruit and vegetables in their diets. This can only be assured when a conscious systematic approach to farming practices is followed by which all methods employed are documented

**Audience Take Away:**

- There are primary aspects attributing to the small fresh produce farmer competitiveness
- While many business owners have interpreted working smarter as including or adopting high-tech systems or automated processes, this is only one aspect of working smarter and soon becomes neutralized when the competition adopts a similar or even smarter technological system
- Creative thinking and initiative from every employee in the organization will escalate the likelihood of better ideas, improve decision making, lead to better quality and productivity, and finally better competitiveness (Goetsch & Davis, 2016:108)

**Biography**

Dr. Lucrecia Valentine, studied Food Technology and Peninsula Technikon, then pursued a qualification in Quality, graduated with Masters in 2009, at Cape Peninsula University of Technology, commenced with PhD in Commerce and Administration at the Cranefield College in 2017 and graduated in 2020. I have worked in the Food industry for more than 20 years with primary focus in the agricultural field. Until recently, part of my work in industry involved assessing food safety and quality systems for certification against international standards. As a lecturer, I introduce the students to these standards, and engage with them on the implementation and maintenance of thereof

**Starodubtsev Volodymyr*, Ladyka M, Vlasenko I**

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## Large role of small relief elements in Precision Agriculture

The implementation of “precision farming” into practice requires a detailed quantitative assessment of the soil cover heterogeneity. Such an assessment is carried out mainly by the provision of soils with gross and mobile forms of nutrients, the presence of toxic substances, the degree of erosion, that is, by dynamic indicators. In the course of 2008-2022, we are studying the spatial heterogeneity of the fundamental indicators of soil cover on the plains of the forest-steppe and steppe zones with chernozems (“black soil”), due to the presence of a micro-relief. It is the presence of relief micro-depressions (“potholes”) that causes the spatial heterogeneity of the water regime of soils on such plains, and, as a result, the heterogeneity of the soil cover. Detailed soil studies using Landsat and Sentinel satellite images, a quadcopter, a GPS receiver and chemical analyzes showed that the soils shown on ordinary soil maps occupy no more than 40-50% of the field area. Detailed soil studies using Landsat and Sentinel satellite images, a quad copter (UAV), a GPS receiver and chemical analyzes showed that the soils shown on ordinary soil maps occupy no more than 40-50% of the field area. The rest of the area is occupied by semi-hydromorphic and even hydromorphic soils, which are formed due to the redistribution of moisture over the micro-relief, primarily during the snowmelt period in spring with the formation of temporary lakes that exist from 2 to 4 weeks, depending on the water reserves in the snow and weather conditions during the snowmelt period. The moisture of summer precipitation is also redistributed over the elements of the micro-relief, contributing to the heterogeneity of the water regime and soil properties and their different productivity. In the fields with winter wheat, the yield at the bottom of the micro-depressions with a depth of about 50 cm was about 30%, and on their slopes - 60-80% of the yield in the flat areas of the field. The ripening of wheat in micro-depressions occurs 1-2 weeks later, which affects the timing of harvesting and the quality of grain. In general, the loss of wheat yield in the studied fields (depending on the area of micro-depressions) was about 30%. On the slopes and bottoms of micro-depressions, weed infestation and weediness of wheat plants increased. Similar yield losses were identified in the fields of alfalfa, barley, sugar beet, but their reliable quantitative assessment is still ongoing. Proposals are being developed to improve agricultural technology in fields with micro-relief, in particular, the introduction of deep loosening of soils in micro-depressions. The distribution of micro-depressions is also analyzed in the forest-steppe and steppe zones of Eurasia, and a refinement of soil maps is proposed in connection with the spatial heterogeneity of the soil cover on plains with micro-relief. The results of the study are of significant ecological and economic importance.

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## Simplified rapid membrane- based viral DNA isolation method for molecular diagnosis of graft transmissible pathogen in Citrus

Citrus is a widely distributed crop all over the world. Citrus is an important fruit crop in India. It is grown in about 0.50 million ha with an annual production of 0.39 million tones. Citrus is infected by a number of graft transmissible pathogen which include Citrus tristeza virus (CTV), Indian Citrus ring spot virus (IRSV), Citrus yellow mosaic virus (CYMV), Citrus exocortis viroid and the Citrus greening bacterium (Candidatus liberibacter asiaticus). These pathogens cause severe yield reduction in citrus and their detection in propagating material is an important component in bud- wood certification programme. Their reliable detection in infected citrus plants is now commonly done by PCR. A membrane based highly simplified DNA template preparation was standardized for detection of CBMV & Citrus greening. The Unified nucleic acid extraction protocol is non-phenol chloroform-based extraction protocol and was comparable with commercial DNA extraction kit for PCR detection of DNA pathogens in Citrus. The study has demonstrated that bark tissues of infected citrus plants can be common sources of nucleic acid template preparation for detection of this pathogens. Membrane based DNA template protocol is a novel approach in PCR detection of virus and greening bacterium and will be highly useful for survey, Sanitary and bud wood certification as well as for phytosanitary purpose in citrus

**Audience Take Away:**

- They learn Simplified rapid membrane- based viral DNA isolation method for molecular diagnosis by PCR
- A membrane based highly simplified DNA template preparation was standardized for detection of CBMV& Citrus greening. The Unified nucleic acid extraction protocol is non-phenol chloroform-based extraction protocol and was comparable with commercial DNA extraction kit for PCR detection of DNA pathogens in Citrus. These methods used in other DNA &RNA Viruses for template preparation for PCR.

**Biography**

Dr. K. N. Gupta studied on Molecular Plant Virology at the Central university, New Delhi as Ph.D. in 2009.and worked on molecular detection and characterization of citrus virus disease with Dr. V. K. Baranwal (National Professor)2Plant Virology Unit, Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi 110012, India. I obtained the position of Scientist, Senior scale at the Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)-482004, India. I was published more than 30 research articles in various journals.)

**Nabil Sabet A. Mustafa[1]*, H.H. Shaarawy[2], M.F. El-Dahshouri[3], A.M. El-Saady[3], Sherin A. Mahfouze[4], Ibrahim A. Matter[5], Lixin Zhang[6] and I.M. El-berry[7]**

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## Effect of Different Nano-NPK fertilizers on Vegetative Growth Parameter and Soil Microbial Activity of Fig Crop Under Different Irrigation Regims

World face several challenges the most decisive climatic changes , freshwater poverty and poor usage efficiency for natural resources (soil & water) particularly in developing countries. Applying Nanotechnology may represent a smart mechanism toward sustainable agricultural. Much efforts have been exerted to utilizing nano-technology and producing agro-chemicals in nano-form i.e, nano-fertilizers and nano-pesticides. Current work that carried out in greenhouse belong pomology department , National Research Centre during 2020/2021, aims to assessing impact of nano-fertilizers on growth performance and soil microbial activity under different drought stress levels. NPK-nano-fetrilizer was applied on uniform one-year old fig seedlings, as foliar application at two levels (200 and 400ppm) compared with traditional NPK fertilizer, under three levels of water regimes (once, twice and three times irrigation weekly. Obtained results indicated that under drought stress nano-fertilizers enhanced fig seedlings growth performance and nutrient content. Moreover, nano-fertilizer raised antioxidant enzyme activity that work on scavenging active oxygen species and thereby reinforce drought stress tolerance in plants. Besides, nano-fertilizer had a positive impact on soil microbial under low soil moisture. This study came in chain of studies which proved the efficiency of nano-fertilizer under drought stress with no negative impact on environments under this study conditions. This study concluded that nano-fertilizer has a bright future particularly under challenges that face the world (climatic changes, poverty of water resources, soil degradation and global food famine risk with fast growing of population) toward sustainable agriculture with low risk on environment.

**Subhas Chandra Datta**

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## A Mobile-App-Geospatial-Ecosystem-Technology of Ginger-Biomedicines-Physiology Prevent Future-Pandemic: Improved Agriculture-Horticulture-Biodiversity-Wildlife-Conservation-Environment

In 2019, the first-pandemic-outbreaks in China, COVID-19, caused by SARS-CoV-2 /-3, has quickly spread worldwide, badly affecting our lives, physical activity, sedentary behavior, food habits, human civilization, etc., with post-COVID-chronic-diseases, and the recent-pandemic-wave also starts from China-again and may cause a high-transmission-rate with pathogenicity-of-mutant-coronavirus that have made COVID-19 a serious-public-health-hazards-globally, weakening the ability of COVID-19-vaccines to prevent-SARS-CoV-2-infection-or-reinfection. To conquer this situation, the use of 'Geospatial-Ecosystem-Technology of Ginger-Biomedicines-Physiology' is used to solve all. The Barddhaman is enriched with the typical 'Geospatial Ecosystem' due to being situated beside the Damodar river with an average of about 58% agricultural population, and the rate of fresh-brown-ginger-best-quality @Rs.65/Kg with @1776 kg/hector rhizome of ginger, is produced, and the 31 ginger wholesalers are present here. The present paper confirms-or-reviews some-typical-Clinical-Case-Reports of COVID 19 patients-consumed-orally the 'Ginger-Biomedicines', prepared from the rhizome of ginger, Zingiber officinale Rosc., at-an-extremely-low-doses mixing @ 5-10drops /100-200ml moderately hot drinking water or tea (in pot), at-random one types of clinical-treatments-drinks @ 3-5times /day for 45-60 days orally in the different-COVID-19-infected areas of Kanchannagar, Burdwan-Municipality by using the powerful "Geospatial-Ecosystem-Technology of Ginger-Biomedicines-Physiology" that will enable us to make better and informed decisions related to biodiversity conservation, production, protected area and price management-tools for preventing the 'Future-Pandemic'. The present study once again confirms the potentiality of 'the biomedicines-Ginger-MT' act as the 'Preventive Natural Gifts' against the 'Omicron-Deltacron-Radhescron-Rupacron-Bodhicron….Futuracron-like-any-future-variants', and 'Other-Diseases' also by increasing natural immunity. It will also review and confirm, "Only The Burdwan-Geospatial-Ecosystem-Technology of Ginger-Biomedicines-Physiology Prevent Future-Pandemic Improving Agriculture-Horticulture-Forestry-Biodiversity-Wildlife-Conservation-Environment-Socioeconomy-Clinical-Treatment-Methods-Medical-Science-Global-Health-Geospatial-Information-Management-Technology-Communication-Geography-Socioeconomy Issues". In near future from the basic-clinical-exploration-research, the combined-biomedicines of common Ginger-MT and black Ginger-MT, may consider the development of new-systems-methods-techniques, drug-design-discovery-specificity-formulation, optimizing-dosage-regimen, drug-delivery-systems-regulation,personalized-emergency-medicine,pharmacogenomics-pharmacokinetics, pharmacodynamics, analytical-sciences-nanotechnology, therapeutic-aspects, quality-control, drug-evaluation of safety and toxicity of drug-molecules, regulatory-medical-science with computational-approaches that bring together a unique and international mix of experts, scientists, researchers, and students to exchange and share their experiences and research outcomes on all elements of natural science, and provide sharing and learning about the latest research on 'Traditional Medicine' and other relevant to 'Medical-and-Health-Sciences, and it is warmly welcomed to join the '2nd Edition Global Conference on Agriculture and Horticulture" during September 1-3, 2022 at Paris, France" to improve the insight on the latest-research in natural-agriculture-horticulture-science as well as save the-World, and it acts-as the most-cost-effective-easily-manufacture-able-easily-applicable-easily-available-and-side-effects-free-eco-friendly-medicines". And the use of 'Mobile-App-Geospatial-Ecosystem-Technology of Ginger-Biomedicines-Physiology' enriches the geospatial platforms for better interpretations and future decision making for effective management, and it fulfills the various objectives; Enhance international collaboration among participants from Member States and relevant stakeholders; Reflect the importance of geospatial information to support evidence-based policy- and decision-making; Address the development and strengthening of geospatial information management and capacities; Demonstrate the importance of international coordination and collaboration for enhancing human data and geography community;

Enhance the role and relevance of geospatial information against the three pillars of sustainable development, for a shared future and a better world, in which all are able to be counted within an inclusive global society. And the United Nations Committee of Experts on Global Geospatial Information Management (GIM) of the United Nations uses Geospatial Technologies in the 'Agriculture and Horticulture, and its various application domains, commercial geospatial sector, academia, and researchers practitioners from across the globe. And this year-2022 is an important year to host the event as a part of the celebration of 'Azadi-Ka-Amrit-Mahotsav' aptly the core theme of "Geo-enabling the Global Village on Agriculture and Horticulture"


## Murari Lal Gaur

Professor (Soil & Water Engineering) PhD (Hydrology, IIT Roorkee), B A
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## ICT Prognoses for Easing Water Scarcity and Its Energy Efficient Management: An Outline


Water needs energy, energy needs water but human development needs both. Their intricate connectivity and dependencies revolve around many elemental issues. Present paper is focused towards deliberating updated overview on prospects of information and communication technology (ICT) applications in water sector, seeing industrial, environmental, agricultural, municipal, domestic, recreational water utility segments. Portrayal of water communities, their existing challenges/risks, budding facets & applicability of ICTs (gadgets, information systems, big-data, models, smart water & energy systems) are deliberated with recently reviewed research results. Useful blend of information is offered on possible ICT amalgamations in water sector for transmuting ill water-systems into smart-water-systems, by achieving higher water productivities. Updated ICT oriented review is provided by uniting key challenges/risks of water applicability segments like transmission losses, leakage detections, energy reduction/recoveries in handling water, integrated water resource management for diverse stakeholders, climate-change, environment, irrigation, rainwater, water-quality, and sanitary aspects. Global initiatives (programs, consortiums, projects, collaborations) on ICTs in water sector are reviewed offering salient potential and forecasts of futuristic ICT based applications in such water segments. Pertinent food for thought is provided to pave road for smarter water management


**Audience Take Away:**

- Audience will be able to realize the growing prospects and potential of probable utilities of IT & ICT based intervention dealing/acting at different nodes of water cycle
- Perceived ICT approaches & their proven potentials to deal water challenges at numerous scales (time as well as space) i.e. catchments, commands, farmers' fields, or any other physiographic units; will be offered. It all together will remains highly useful for stakeholders working under NRM domain; specifically, the land and water management
- Feedbacks from relevant indicative efforts and success stories, will remains highly useful for watershed managers, command area specialists, multiple field functionaries in land & water sectors, land use experts, researchers, academicians and even the policy planners seeking relevant smart solutions in water sector for enhanced water productivity at one side while climate change dealing on other

**Biography**

Dr. Murari Lal Gaur is a renowned soil & water conservation engineer who earned his B Tech (Agril. Engg.) @1984 followed by Masters/ Doctoral @2000 in Hydrology from IIT Roorkee. He has more than 37 years diverse experience with 24 years working in ICAR @ ARS1986 keeping positions up to Principal Scientist. Since last 13 years he is in Anand Agril University (AAU) Gujarat, as one of the senior Professor. Prior to it he had been HOD, founder Principal & Dean for newly established Agril Engg College & faculty at Godhra. He has fabulous exposures in NRM domain, being engaged in water & watershed-based R&D projects ever since start of his career; by serving 5 prime ICAR institutions dealing 21 experimental research projects and more than 30 watershed schemes with 4 different ministries in 6 Indian states. He has sound strengths on conceptualizing/executing giant outsourced R&D projects, technology transmissions, profound class room teaching (diploma to doctorate programs at 6 colleges), guiding dozens of M Tech & PhD students, Research & Academic infrastructure creation, RMP, and multidisciplinary/multi-institutional working. He has 12 key national awards/ recognitions in his name with more than 100 publications of global repute including policy-oriented books/R&D outcomes

**Umair Ashraf[1]*, Shakeel Ahmad Anjum[2], Sidra Naseer[3]**

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## Exogenous Gamma Amino Butyric Acid Application Improved the Performance of Fragrant Rice under Water Deficit Conditions

Water deficit conditions causes physiological and biochemical interventions in crop plants; however, gamma amino butyric acid (GABA) may induce tolerance in crop under water stress conditions. The present study was comprised of two fragrant rice varieties i.e., Super Basmati and Basmati-515, two water levels i.e., 100% and 50% field capacity, and four GABA levels i.e., 0 (control), 1, 1.5 and 2 mM. Rice seedlings (30 days old) were transplanted into pots in July 2018 and drought stress was induced after 35 days of transplanting. Results depicted that the GABA treatment, water levels and rice varieties significantly affected the biochemical, physiological and yield attributes. GABA application significantly improved total soluble proteins, total free amino acids, peroxidase, catalase and anthocyanin and reduced hydrogen peroxide in two rice cultivars under drought stress. Data also revealed positive effect of GABA on physiological, yield, and yield indices in two rice varieties under limited water supply. Grain yield was increased up to 31% under well-water and 37% in water stress conditions by the application of GABA in Super Basmati compared with control, whereas in Basmati-515, the grain yield was increased up to 27% and 28% in well water and water stress treatment, respectively. Higher grain yield indicated that GABA induced tolerance in Super Basmati subjected to drought stress. Overall, GABA improved the performance of fragrant rice under water deficit conditions

**Audience Take Away:**

- Climate change a multi-facet field, encompasses different abiotic factors/stressors occur in the environment that generally impose stress on a wide variety of plant species
- Gamma-aminobutyric acid (GABA) is a four-carbon non-protein amino acid has been recognized as endogenous plant signaling molecule that regulates plant response to a range of stresses. So, it is important to the researchers to investigate the drought tolerance in rice
- This study would further help the farmers/rice growers to adopt GABA application as water stress mitigation strategy

**Biography**

Dr. Umair Ashraf is young scientist and serving as an Assistant Professor in the Department of Botany, University of Education, Lahore, Punjab, Pakistan. He got his doctorate degree from South China Agricultural University, Guangzhou China. During his doctorate degree, he has won many international awards i.e., Excellent PhD Dissertation Award, Outstanding International Student Award, Award of Excellence in Research, and Excellent International Student Award. He has published more than 125 research articles in peer reviewed SCI journals with more than 400 cumulative impact factor and 4000 citations. He also authored more than 10 book chapters and numerous news articles. He is also acting as an editor of different SCI journals including PLoS One, Journal of Chemistry and BMC Plant Biology. His area of expertise is plant stress physiology and crop management strategies under stressful environments

**Parthasarathi Theivasigamani*,Minulin Beulah, Geethanjali, Ananya, Manoj Kumaar, Einstein Mariya David, Utpal Das, Saiyyeda Firdous**

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## Biosynthesis of Sulfur nanoparticles from tea (Camellia sinensis) waste and its effects o plant growth promotion

Nanobiotechnology has established a significant contribution in recent days toward sustainable agriculture by increasing crop yields and enhancing the quality of the soil. It also has specific purposes like nanobiofertilizers, plant growth promotors, and nanobiostimulants that improve productivity without contaminating soils. It also helps in bioremediation, protecting plants from pests and various biological illnesses. In recent research, nanobiostimulants has very different and unique properties compared to chemical fertilizers. Recently, farmers have been searching for cost-effective alternatives and have better efficiency of fertilizers to increase their overall yield with less environmental effect. So, there is various research in nanobiotechnology, which can be an alternative to chemical fertilizers and replace chemical pesticides. Sulfur is necessary for the growth and development of plants like any other nutrient. Sulfur is also one of the crucial nutrients that are required for plant growth. It plays an essential role in chlorophyll formation, allowing plants to generate carbohydrates, sugars, vitamins, oils, fats, and other components through photosynthesis. So, sulfur gained some importance in this work that we performed. The sulphur NPs have certain nutrient content, which increases the absorption duration and will help extend nutrient availability for plants for an extended time. Applying sulphur NPs to plants will help improve yield and increase nutrients. Sulfur nanoparticles were biosynthesized using a suitable precursor. The tea dust waste has been used to prepare a tea extract, this tea extract act as a balancing agent in SNPs synthesis. To understand the working efficiency of Sulphur NPs in plants by observing the physiological and morphological traits of fenugreek plants by application of green synthesized sulphur nanoparticles at different concentrations in Petri plate study and further studied with an effective concentration in pot study

**Audience Take Away:**

- Attendees will get to know about the biosynthesis of NPs from waste to a helpful nanobiostimulants
- This topic will help them to incorporate the same method in different aspects. This research topic will encourage other researchers to understand the concept of biosynthesis and its significant impacts on research and teaching; It also provides a practical solution to the problem by replacing the toxic chemical fertilizers with the help of synthesized nanobiostimulants
- Creates awareness on using the effects of toxic chemical fertilizer

**Biography**

Dr Parthasarathi studied M.Sc. in agriculture at Tamil Nadu Agricultural University and graduated in 2010. Then he joined PhD in the same university and received a PhD in April 2014. Dr T. Parthasarathi did his post-doctorate at Ben-Gurion University of the Negev, Israel, from 2016-2018. His research in Israel was on grafting tomato plants to commercial rootstocks with saline water irrigation. Based on his post-doctoral research experience, he has developed a root camera to study the root system of rootstock plants for controlled greenhouses. His essential research contributions include grafting physiology, root phenomics and genomics of horticultural plants. He has published more than 30 research articles. He is currently guiding four PhD scholars and fifteen undergraduate research students

**Muhammad Awais Rafiq**
Citiscape- Horticulture & Landscape, FSD, Pakistan

## Supplemental foliar applied mixture of amino acids and seaweed extract improved vegetative growth, yield and quality of citrus fruit

Poor tree nutrient management significantly reduce productivity and quality of citrus fruit. Hence in three separate experiments, exogenous supplemental application of 0.5 mL L– 1 'Primo' (Ascophylum nodosum seaweed extract + amino acid and) + 0.01% 'Tween 20' ) was sprayed on citrus cvs. 'Kinnow', 'Feutrell's Early' mandarins and 'Blood Red' orange trees. Trees were sprayed at full bloom (T2), fruit setting (T3), full bloom + fruit setting (T4), or full bloom + fruit setting + premature (T5) stages at a same concentration. Unsprayed trees of each cvs. were kept as control (T1). In contrast to untreated control trees, the application of 0.05% Primo at full bloom + fruit setting stage caused significant increase in leaf N (28%), K (36%), Mn (24.4%), Zn (15.8%), tree height (28.5%), fruit weight tree– 1 (42.6%), fruits tree– 1 (28.6%), marketable fruit (9%), fruit size (11.5%), SSC (16%), SSC:TA ratio (26.8%), reducing sugars (37.5%), ascorbic acid (21.8%) and total phenolic contents (42%) in 'Kinnow' mandarins. Likewise, sprayed trees of 'Feutrell's Early' in T4 exhibits higher leaf N (27%), Fe (11.9%), Zn (26.4%), fruit weight tree– 1 (28.5%), fruits tree– 1 (40%), marketable fruit (12.7%), fruit size (15.9%), juice weight percentage (17.6%), taste (23%), SSC (15.7%) and total sugars (42%). Whereas, in case of 'Blood Red' oranges, same treatment (T4) resulted in highest level of leaf N (50%), Fe (15%), tree height (37%), leaf size (38.8%), fruit weight tree– 1 (42%), number of fruits tree– 1 (45%), marketable fruit (8%), juice weight percentage (15.6%), SSC (19%), SSC:TA ratio (43.8%), reducing sugars (45%) and total phenolic contents (28%) than control. In addition, reduction in fruit drop, peel thickness and TA were also observed in treated trees of all cvs. as compared to untreated control. In conclusion, supplemental application of 0.5 mL L– 1 'Primo' at full bloom + fruit setting stages improved vegetative growth, productivity and quality of 'Kinnow', 'Feutrell's Early' and 'Blood Red' fruits

# Participants List

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