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3RD EDITION OF EURO-GLOBAL CONFERENCE ON

FOOD SCIENCE AND TECHNOLOGY

Sept 30-OCT 01, 2021

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FAT 2021

Book of Abstracts

3RD EDITION OF EURO-GLOBAL CONFERENCE ON

FOOD SCIENCE AND TECHNOLOGY

Sept 30-Oct 01, 2021

Theme:

Foreground for Advanced Researches in Food Science and Technology

INDEX

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 FAT 2021

Magnus Group welcomes you to our Online Event entitled "3rd Edition of Euro-Global Conference on Food Science and Technology" FAT 2021 scheduled on September 30 to October 01, 2021 with the theme" Foreground for Advanced Researches in Food Science and Technology"

FAT 2021 takes the privilege opportunity to transfer knowledge from research to industry and transfigure food safety for secured and a healthy future. FAT 2021 conference brings together all leading academics, professionals, entrepreneurs, industrialists and engineers on a single forum to address current and future aspects of digital and smart agriculture. This is your best opportunity to meet the world's largest community of participants.

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KEYNOTE FORUM | DAY 1

3RD EDITION OF

EURO-GLOBAL CONFERENCE ON

FOOD SCIENCE AND TECHNOLOGY

SEP 30-OCT 01, 2021

Yechiam Shapira*, Ron Mor and Allan Heres
Phibro Aqua, Israel

The effect of PAQ-Tivate™ as a preservative agent against bacteria and fungi/molds in commercial tilapia feed

In this study, we investigated 5 g of PAQ-Tivate™/kg of feed as a preservative agent against bacteria and fungi in formulated tilapia feed. PAQ-Tivate is a feed additive of organic acids. The feed samples were moistened with 15% distilled water (v/w) and the appropriate amounts of the feed additive were added to the pellets. A sample with no water and no additive served as a negative control, while a sample which included 15% distilled water (v/w) but without any feed additive served as the positive control. All the samples were incubated at 28°C and the humidity level was maintained at 75-85%. Each treatment was sampled at days 1, 3, 7 and 14 from wetting. The test parameters were visual presence of fungi on the pellets, total yeast/mold count (TYMC) and total aerobic microbial count (TAMC). The results showed that at day 3, the levels of bacteria in the positive control samples were significantly higher compared to the PAQ-TivateTM treatments. At day 14, PAQ-TivateTM treatment of 5 g/kg feed had a significantly lower levels of bacteria compared to the positive control group. With respect to fungal levels on day 14, the 5 g/kg feed treatment of PAQ-Tivate™ had a significantly lower count of fungi compared the positive control groups. The 5 g/kg treatment of PAQ-TivateTM resulted in a significant reduction in the fungi/molds count from day 7 to day 14. At day 14, there was a clear growth of fungi on the feed samples of the positive control. There was no visible growth of fungi in the 5 g/kg treatment of PAQ-Tivate™ on day 14.

Image 1

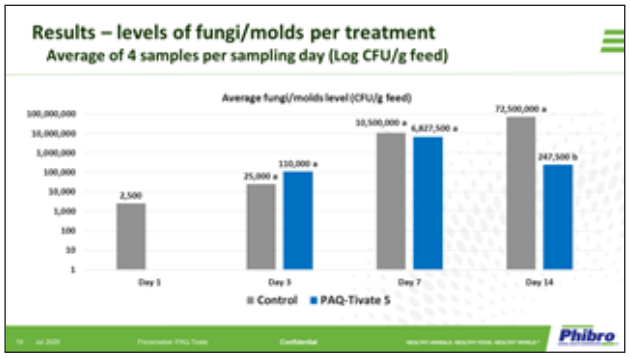
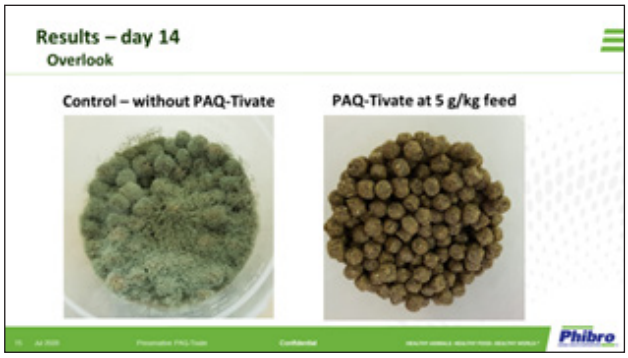


Image 2



Biography:

Yechiam Shapira has 30 years of experience in the aquaculture sector, as a fish farmer, biologist, fish health expert and R&D researcher. He has a master degree in fish health and fish genetics, from The Hebrew University of Jerusalem, Rehovot. In his master research, he was testing various aspects of the Koi Herpes Virus. As an R&D researcher, Yechiam was in charge of execution of studies in the laboratory and in the field; Development of autogenous vaccines for tilapia and grey mullet; from the isolation of bacteria in the field, design of various vaccine formulations, efficacy trials and field application in the farms; Development of methods for complement activity, lysozyme activity and MIC studies; Today Yechiam is working in Phibro as a Professional support manager for the Israeli fish farmers – fish analysis, farms auditing, deep research of selected topics, development of vaccines and execution of field observations and laboratory trials.

Suriyavathana Muthukrishnan
Associate Professor, Department of Biochemistry, Periyar University, Salem, Tamil Nadu, India

Molecular Docking and Dynamic Studies of Bioactive Compounds from *Triticum aestivum*(L.) Against Obesity Enzymes

Obesity is becoming a major health problem worldwide despite medical and political efforts to control its increased prevalence. Despite the recent success in identifying the molecular mechanisms controlling energy homoeostasis, the truth is that there are no efficient treatments besides surgical approaches. Thus an immediate challenge is to identify who among these obese individuals will be at high risk of developing metabolic complications. Overweight, obesity, and the metabolic syndrome have recently emerged as strong independent risk factors for CKD and ESRD.Today more than 1.1 billion people are overweight worldwide and 312 million are classified as obese. Adipogenesis is a process of adipocytes cell proliferation accompanied by adipocyte differentiation which is regulated by cascade involving many transcription factors PPARγ, C/EBPα and SREBP1c.

Plants used for traditional medicine contain a wide range of substances to treat chronic as well as infectious diseases. Due to the development of adverse effects, microbial resistance to the chemically synthesized drugs, men turned to ethnopharmacognosy. They found literally thousands of phytochemicals from plants as safe-broadly effective alternatives with less adverse effect. The term "Alternative Medicine" became very common in western culture, focus on idea of using plants for medicinal purpose, as raw materials for extraction of active ingredients which used in the synthesis of different drugs.

Triticum aestivum Linn. commonly called wheat grass under Gramineae, a genus of annual and biennial grasses. Wheat grass is a good source of mineral nutrients contains significant amounts of Fe, P, Mg, Mn, Cu and Zn also rich source of tocopherols with high vitamin E potency. It is also claimed to reduce hair graying, improves digestion, reduces high BP as it enhances the capillaries, support the growth of Lactobacilli, remove heavy metals from the body

Obesity is caused primarily by lipid metabolism disorder. The enzymes involved in lipid metabolism used as targets in the development of new anti obesity drugs. Pancreatic lipase, key enzyme hydrolyzing 50–70% of total dietary fats. Therefore lipase inhibitors from plants considered as good source for anti obesity drugs. In addition, identifying such inhibitors will help to disclose the mechanisms of the plants nutritious effects. Study on the mechanism of molecular interaction between active compounds and enzymes can reveal pharmacokinetics as well as the relationship between the chemical structures and bioactivity of a drug.

The molecular modeling study is another important tool for revealing the interactions between enzymes and their inhibitors, which could help to clarify directly the nature of binding between small molecules and enzymes. Molecular docking was used to explore the efficacy of Wg components to inhibit the key enzymes related with obesity.. The two important drug target protein/enzyme/receptor to study the quorum sensing mechanism using computational biology tools using Structure of human PTP1B catalytic domain and Structure of pancreatic lipase. Molecular dynamics studies revealed that Wg compounds had minimum potential energy with target protein. In order to understand the mechanism of ligand binding and to identify potent PTP 1B and PL inhibitors, a study involving molecular docking and virtual screening have been performed. It can be concluded that these phytochemicals or their derivatives can be used for further in-vitro and in- vivo studies to design valuable drugs.

Audience Take Away:

- Provide knowledge use of herbal medicines in Asia represents a long history of human interactions with the environment, endless treasure of herbs
- Current scenario on complications of obesity and the development of natural products for the treatment of obesity is a challenging task
- Express knowledge on molecular modeling study an important tool for revealing the interactions between enzymes and their inhibitors, which could help to clarify directly the nature of binding between small molecules and enzymes
- Learning on inhibition of obesity associated enzymes by the Wg derived phytochemicals. Molecular docking was used to explore the efficacy of Wg components to inhibit the key enzymes related with obesity; pancreatic lipase and Protein tyrosine phosphatase 1B

Biography:

Dr. (Mrs.)M.Suriyavathana,M.Sc.,M.Phil.,Ph.D graduated at Bharathiar University in 1991. She received her Doctoral degree in 2007 at the Bharathiar University. She obtained the position of Associate Professor at Periyar University, Salem, Tamilnadu. To her credentials she has published more than 70 research articles and 3 books (national & international). To her research expertise she has guided 32 M.Phil and 19 Ph.D candidates. She has delivered plenary lectures in International conferences at USA and UAE. She has organized 7 national and international conferences and seminars and she has received her patent, to her credit she has been awarded as best Researcher /Women scientist in 2015.

Victor Fedorovich Stukach[1]* and Yelena V. SHEVCHENKO[2]

[1]Omsk State Agrarian University, Russia

[2]Head of the Center for Innovation and Technology Development, National Agency for Innovation Development "QazInnovations" Nur-Sultan, Kazakhstan

Providing food support to socially vulnerable population groups due to the agricultural resources of the region in the context coping with the consequences of the Pandemic

The problem of providing food to socially unprotected groups of the population is considered, measures are proposed to develop the infrastructure of domestic food aid, as well as to create a mechanism for combining market, distribution and informal nutrition institutions for the poor. The main aspects of the problem are the process of providing food to the most needy segments of the population, the use of land withdrawn from circulation for organic production, the system of state support, the creation of market infrastructure in this area, overcoming the consequences of the pandemic.

The mechanisms of motivating land users to use soil protection technologies, stimulating the use of "abandoned" lands through state support, and introducing degraded lands into agricultural circulation are proposed. In 2018-2020, Omsk State Agrarian University conducted a comprehensive study of the problem of providing unprotected segments of the population with environmentally friendly food products using the resource of land withdrawn from agricultural circulation. An industrial production and logistics center is being created as a specific infrastructure institution in the region.

The main functions of the production and logistics center of the megapolis are the synchronization of information flows: reception and storage of agricultural raw materials and food from agricultural producers; processing of agricultural raw materials and food in their own production organizations.

A specialized production and logistics center will eliminate inefficient intermediaries, reduce storage costs and increase the share of agricultural producers in the final price of the consumer in the food chain. The implementation of this approach will serve as an incentive for the development of agriculture. An assessment of the effectiveness and expediency of work on the involvement of unused arable land in agricultural turnover was carried out. The effectiveness and expediency of restoring degraded lands that were destroyed were justified. The transformation of degraded land into agricultural turnover will allow for efficient use of land and generate additional income. Large-scale production of food and semi-finished products will allow using innovative technologies, saving resources, ensuring quality control of ingredients, flexibility in planning food preparation, and efficient use of production capacities.

The impact of the results obtained. Creation of a unified supplier system that provides centralized selection, delivery, quality and safety control of products, purchase of products directly from the manufacturer-local agricultural producers;

- strict input control of the supplied raw materials (technologists, sanitary doctors, production control specialists, etc.)

- Creation of new jobs in the industrial production system of high-readiness food preparation; Creation of a system of complete incoming and outgoing production control, including using laboratory and instrumental methods;

- Reduction of losses at all stages of agricultural production and sales (through the use of hightech equipment, the use of special accounting and control systems for production, storage); Providing food to social network clients, children with hot meals in preschool and general education institutions by subsidizing part of the costs to low-income parents;

- a large amount of food is sent to the domestic food aid system (18-22% of the food consumed in the region), which ensures guaranteed domestic demand for local producers;

- the funds of the regional budget allocated for food aid to socially unprotected segments of the population are involved in the production turnover. The study identifies the areas of work and spheres of influence: In the field of state support - the gradual expansion of state guarantees;

- in the field of domestic food assistance to the population-the formation of public-private partnership in the creation and organization of infrastructure facilities; Coordination of cooperation between the participants of the industrial, social, credit, financial and trade spheres, the functioning of the settlement and payment system. obtained from organic farming can be a valuable raw material for the production of food with increased nutritional value.

Audience Take Away:

- Proposed solutions to the complex of problems related to overcoming the consequences of the pandemic: state support for those in need, preservation of land fertility, industrial cooking technologies, creation of specific infrastructure with industrial food technologies, infrastructural interaction of all participants
- Viewers will be able to apply the methodology of analysis and mechanisms of interaction of participants, direct entrepreneurs, public-private partnerships, state and municipal authorities
- The proposed developments can be used in social work, political activity, education, regional and municipal management and management. Could these practical solutions simplify or make the work of the speaker presenting the solution of the problem more effective? The proposed model will provide new information for solving the problems of designing mechanisms in the field of interaction of market, information and financial structures

Biography:

Viktor Fedorovich Stukach. Professor of Omsk State Agrarian University, founder of the scientific school "Problems of development of the infrastructure of the agro-industrial complex of the Siberian region" Has achievements in the training of highly qualified scientific personnel. Under the guidance of Professor V. F. Stukach, 43 dissertations were defended, including 38 candidates of economic sciences, 2 doctors of Economic Sciences and 3 PhD doctors in economics. He is a member of the editorial boards of Russian and international scientific journals. He was awarded the honorary title "Honored Worker of the Higher School of the Russian Federation". He was awarded the Gold Medal of the European Chamber of Science and Industry for pedagogical activity and conducting original research in the field of development of the Siberian agro-industrial complex (2012), medals of Vernadsky, Adam Smith, Kliment Timiryazev, Mikhail Lomonosov, etc.

Dr. Yelena Shevchenko is a foresighter and R&D policy expert. She has been involved in coordination and methodological support of R&D commercialization activities on the country level. In the last years she has coordinated large scale national foresight exercises supporting the elaboration of the national strategies in science, technology and innovation (STI) development. She participated in designing of the National Strategy of the Republic of Kazakhstan on Innovation Development and Inter-Sectoral Plan of Science and Technology Development in Kazakhstan till the year 2020. She also has been involved in designing national innovation policy in Kazakhstan, including elaboration strategy for startups and entrepreneurship development. Dr. Shevchenko has 15 years' experience in grant funding on innovation and R&D commercialization; she is acting as an expert for evaluation of commercialization and innovation grant proposals. She has been a jury member in competitions conducted in Kazakhstan for innovators, young scientists and entrepreneurs. She participates as an expert on seminars and round tables conducted by United Nations Economic Commission for Europe on issues related to science,

technology and innovation development and involved in activities of Regional Environmental Centre for Central Asia. She has been involved in consultancy for elaboration of startups growth strategy, technology innovation, development of business models for technology commercialization. She is a member of organizers team for the national competition for young scientists "FameLab" and national competition for students "Science Stars", which are conducted in Kazakhstan on yearly basis in collaboration with British Council. Dr. Shevchenko has work experience for 18 years in the field of innovation development and R&D commercialization. She has 2 monographs on foresight and more than 60 research papers on STI development.

She holds a Ph.D. in Economics and is an active member of the National Bioethics Committee of the Republic of Kazakhstan.

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 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 as 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 be highlighted. 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 pregelatinized 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:

- By hearing this lecture, public will think processing of grains at a smaller scale, even at house hold no. of grains could be processed and how on large scale grains are processed will be highlighted
- 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 discussed

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 80 research papers, inventor of several processes, one Patent was commercialized to 30 industries. Handled several National & International projects. Guided 70 -75 B.Tech, M.Tech, M.Sc 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. Life Time Achievement Awardee from the ACCTI, Dehradun, India.

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SPEAKERS DAY 1

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SEP 30-OCT 01, 2021

FAT 2021

Mansura Mokbul[1,2*], Yuen Lin Cheow[1], Lee Fong Siow[1]

[1]School of Science, Monash University Malaysia, 47500, Bandar Sunway, Selangor, Malaysia

[2]Department of Food Technology and Nutrition Science, Noakhali Science and Technology University, Sonapur 3814, Noakhali, Bangladesh

Supercritical Carbon Dioxide and Soxhlet Extraction: Physicochemical Properties of Mango (*Mangifera indica L.*, Dragon variety) Kernel Fat

Cocoa is the main ingredient of chocolate because of its specific snap, gloss and texture characteristics. Due to high demand and limited supply, people are interested in cocoa butter alternatives. Mango kernel fat (MKF), which is rich in monounsaturated triglycerides, is a potential cocoa butter alternative. Mango fat content and composition varies depending on origin and maturity. This study aims to investigate the yield and physicochemical properties of Dragon variety (*Mangifera indica L.*) MKF extracted by supercritical carbon-dioxide (SC-CO2) and Soxhlet extraction.

The physicochemical properties were assessed by analysing fatty acid content, triacylglycerol constituent, melting and crystallization behaviour, solid fat content using gas chromatography, high pressure liquid chromatography, differential scanning calorimetry, respectively. The yield was 6.59% to 9.65% depending on temperature, pressure, and time conditions. Soxhlet and SC-CO2 extraction yields, and physicochemical properties were comparable. The MKF showed higher level of stearic acid (primarily StOSt, 1,3-distearoyl-2-oleoyl-glycerol) for 72 °C, 300 bar and 3 hours extraction. Melting and crystallization peaks ranged from -9.84 °C to 39.13 °C and 16.69 °C to -11.23 °C, respectively. SFC became zero between 40-45 °C. The high StOSt content of MKF aid in fractionation and making heat-resistant fat in the confectionery industry.

Audience Take Away:

- This study provides information regarding the Dragon variety mango kernel fat (MKF) content
- The extraction condition of SC-CO2 where stearic acid and 1,3-distearoyl-2-oleoyl-glycerol (StOSt) amount both are the highest
- This high StOSt content MKF can be used for fractionation and confectionery where high melting fats are needed

Biography

Mansura Mokbul completed her MS in Human Nutrition from Ghent University in 2014. To widen her knowledge in the food science field, she joined the PhD program at School of Science, Monash University, Malaysia in 2019. Now she is working on preparing cocoa butter alternatives from oil blends. She is also working as a faculty member in Noakhali Science and Technology University, Sonapur, Bangladesh since 2015.

Yi Qin
College of Enology, Northwest A&F University, Yangling, Shaanxi, China

Weakening Ethanol Synthesis Capacity of *Saccharomyces cerevisiae* with Randomly Mutated SPT15 Transcription Regulator

With the global warming,over recent decades, the alcohol concentration of wines produced by many warm regions around the world has increased by approximately 2% (v/v). There is significant interest in the wine industry to develop methods to reduce the ethanol content of wine. Generally, microbiological strategies relating to the isolation and/or generation of the yeast strains used to make wine have proved to be the simplest and most economical methods, including *Saccharomyces cerevisiae* and non-conventional yeast species. In this study, we used global transcriptional machinery engineering (gTME) technology, based on the mutation of the SPT15 gene, to weaken the capacity of S. cerevisiae to produce ethanol and ultimately created a new strain of S. *cerevisiae* (YS59-409) , with ethanol-production capacity reduced by 34.9% compared to the control strain. Sequence analysis was performed on the mutated SPT15 gene, demonstrating that the five mutation sites (Ile46Met, Asp56Gly, Ser118Pro, Tyr195His and Leu205Ser) may work collectively, or at least partly, to create the specific characteristics of YS59-409, including a higher CO_2 release, biomass, and glycerol formation. The integration of RNA-Seq and metabolomics analysis showed that the specific phenotype of the new mutant strain featured changes in ribosome biogenesis, nucleotide metabolism, glycolysis flux, the Crabtree effect, NAD^+/NADH homeostasis, and energy metabolism. Furthermore, two genes related to energy metabolism, RGI1 and RGI2, were found to be associated with the weakened ethanol production capacity, although the precise mechanisms involved need to be further elucidated. In summary, this study highlights the potential to use gTME technology to reduce the ethanol content of yeast for the wine-making industry.

Audience Take Away:

- It is possible to reduce ethanol yields in yeast with mutated SPT15 transcription regulator
- We can get some knowledge from this study, which could be used to direct strategies for generating wine yeast with weakened ethanol production capacity using other approaches, such as adaptive evolution
- These results obtained in this study confirm the metabolic reprograming of the mutant strain, emphasizing the potential of gTME technology applying to reduce ethanol content of yeast in wine-making

Biography

Dr. Yi Qin studied Food Science at the Northwest A&F University, Yangling and graduated as MS in 2007. He then joined the research group of Prof. Jian Chen at the Jiangnan University in Wuxi, to study Fermentation Engineering. He received his PhD degree in 2011 at the same institution. He obtained the position of an Associate Professor at the Northwest A&F University. He has published more than 20 research articles in SCI(E) and CSCD journals.

S. Thaikua[1]*, R. Poungkaew[1], P. Chanpeng[1], P. Chuchuay[1], N. Kotphrom[1], M. Ebina[2] and Y. Kawamoto[3]

[1]Bureau of Animal Nutrition Development, Department of Livestock Development, Bangkadi, Pathumtani, Thailand,
[2]Institute of Livestock and Grassland Science, National Agriculture and Food Research Organization, Nasushiobara, Tochigi, Japan,
[3]Faculty of Agriculture, University of the Ryukyus, Nishihara, Nakagami, Okinawa, Japan

The possibility in prediction of nutritive value of forage crop by ground plant density

We propose the possibility in prediction of nutritive value of forage including neutral detergent fiber (NDF) and its digestibility, and crude protein (nitrogen content) with the conventional mechanical method as ground plant density determination. Genotypes of *Brachiaria* species were used as plant model in the experiment. Zero point five mm size of ground stems and leaves were mixed well with the ratio (volume to volume) of 0:10, 1:9, 3:7, 4:6, 5:5, 6:4, 7:3, 8:2, 9:1 and 10:0. The estimated volume of all samples were measured by 50-ml. centrifuge tube for 50 ml, and the weight of respective samples were determined by analytical balance for 5 replications. All sample density (D) was calculated as weight/estimated volume. NDF was analysed by standard method with slightly modification, in vitro dry matter digestibility (IVDMD) was analysed by pepsin-cellulase method, in vitro NDF digestibility (IVNDFD) was calculated as IVNDFD = 100 × (IVDMD – 100 + NDF%) / NDF%, and nitrogen content (N) was analysed by NC analyser. Correlation and simple regression between D and NDF, D and IVDMD, D and IVNDFD, and D and N were computed. It was found that the ranges of density, NDF, IVDMD, IVNDFD and nitrogen content were 0.3731−0.3995 g/ml, 73.41−82.88 % of dry matter, 48.51−58.98 %, 37.87−44.12 % of NDF, and 0.52−1.11 % of dry matter respectively. There were significant relation between density and these 4 traits with the correlation efficiency of 0.9773 (P≤0.00001), −0.9623 (P≤0.00001), −0.9229 (P≤0.00001), and −0.9712 (P≤0.00001) respectively. While r-squared of regression were 0.9555, 0.9262, 0.8527 and 0.9432 respectively with the equation as NDF = 332.51D-49.442, IVDMD = −374D+197.21, IVNDFD= −226.13D+127.59, and N = −21.331D+8.9892, respectively. The positive relationship between ground plant density and fiber trait could be the direct effect from density of cell wall content. Whereas the negative relationship of the density and nitrogen content may due to the proportion of cytoplasm, which negatively relates to the thickness of cell wall. This preliminary data reveals that the development of standard methods for predicting nutritive value in forage crop by this simple mechanical method is feasible.

Audience Take Away:

- This work shows the possibility in development of the reliable inexpensive method in prediction of chemical composition in plant
- The developed method will be useful in the researches with large number of sample such as forage crop breeding for increased nutritive value
- The developed method will also be beneficial to the small research units which have limited fund
- Lastly, the work shows the idea of sample preparation for other regression-based analytical techniques

Biography

Dr. Sarayut Thaikua studied Biology at Ramkhamheang University, Thailand and graduated as BS in 1996. He then joined the Shrimp research group of Prof. Flegel at the National Center for Genetic Engineering and Biotechnology, Thailand as the technician for 3 years. He then worked as scientist, pasture science, at Department of Livestock Development (DLD), Thailand for 5 years. In 2005, he studied Plant breeding at Khonkaen University, Thailand and graduated as MS in 2009. He then returned to work at DLD again, focused on forage crop breeding. In 2012, He got the scholarship from Royal Thai government for PhD, and he received his Ph.D. Science of Bioresource Production (Pasture Science) at Kagoshima University, Japan in 2015, with supervised by Prof. Yasuhiro Kawamoto. After half year postdoctoral fellowship supervised by Prof. Kawamoto at the Pasture science laboratory, University of the Ryukyus, Japan he returned to DLD at the same position. He has published 2 research articles in SCI (E) journals as First author, and 4 articles as co-author.

Donruedee Toyen[1]*, Piyanan Thanomchat[2] Kiadtisak saenboonruang[3], Kathiradon Wittayaphan[4], Udomlak Sukatta[5], Patcharaporn Siwayaprahm[6]

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[3]Department of Applied Radiation and Isotopes, Faculty of Science, Kasetsart University, Bangkok, Thailand,
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[5]Kasetsart Agricultural and Agro-Industrial Product Improvement Institute,Bangkok, Thailand,
[6]Department of Microbiology, Faculty of Science, Kasetsart University, Bangkok, Thailand

Effect of UV-C on Shelf-Life Extension in Sea Grapes (*Caulerpa lentillifera*)

Ultraviolet-C (UV-C) irradiation is one of common and promising methods to inhibit the growth of microorganism, consequently resulting in lower risks of foodborne illnesses and the extension of shelf-life in fresh fruits and vegetables. Therefore, this work aimed to utilize the advantages of UV-C irradiation on sea grapes (*Caulerpa lentillifera*), edible seaweed containing vast proportions of minerals and vitamins. Despite their nutrient-rich properties, sea grapes have a short shelf-life of just 3 – 5 days, leading to stringent requirement in product transportation and storage. To investigate the expected potential of UV-C, sea grapes were irradiated with varying durations of 0 (control), 20, 40, and 60 sec, which led to the total exposures of 0, 0.02, 0.04, and 0.06 kJ/m^2, respectively. Then, 150 g of irradiated sea grapes were stored in polypropylene boxes and kept at 25°C for 5 days; for which their changes in microbial, chemical, and physical properties of the samples were constantly observed and measured. The results showed that the average total bacterial counts decreased from 5.30 log CFU/g to 4.88, 4.37 and 4.53 log CFU/g for samples with the irradiated times of 0, 20, 40, and 60 sec, respectively. However, we found that numbers of yeast and mold were insignificantly different for samples with different UV-C exposures. Specifically for samples with 60-sec irradiation, they exhibited weight loss of just 39.5% (lower than those in the control), while showing unchanged physical appearances after being observed using SEM and stereo microscope. Lastly, the enhancement of total phenolic compounds and the oxidation resistance by DPPH method were also observed in samples with 60-sec irradiation in comparison with those in the control. In summary, the overall results suggested that the UV-C irradiation had great potential in the extension shelf-life, while maintaining/improving preferred properties of the sea grapes.

Audience Take Away:

- Optimal durations and doses of UV radiation to reduce microbial counts and to extend shelf-life of sea grapes (*Caulerpa lentillifera*) will be discussed and reported
- Effects of UV-C irradiation on chemical and physical properties of sea grapes (*Caulerpa lentillifera*) with varying doses will be discussed and reported

Biography

Donruedee Toyen graduated with a bachelor's and master's degrees from the Department of Applied Radiation and Isotopes, Faculty of Science, Kasetsart University, in 2016 and 2019, respectively. I am currently working as a researcher at the Scientific Equipment and Research Division, Kasetsart University Research and Development Institute (KURDI), Thailand; for which my main responsibilities include being an operator for Scanning Electron Microscope (SEM) and performing researches on potential utilizations of radiation in biological and material developments. In the past, I have published seven international peer-reviewed research articles relating to the development of nuclear materials and radiation protections.

Tri Agus Siswoyo
Graduate School of Biotechnology, The Center of Excellence on Crop Industrial Biotechnology (PUI-PT BioTIn), University of Jember, Jember 68121, Indonesia

Improving the Quality for the Development Melinjo Flour

The growth rate of the Indonesian population increases the community's dependence on wheat flour, which is wholly made from imported wheat. Local protein and carbohydrate sources that can function strategically as food reserves are traditional Indonesian seeds, tubers, and roots. Seed, tubers, and roots also contain bioactive compounds with physiological effects as antioxidants, antidiabetic and antihypertensive. The bioactive compounds found in these inferior local seeds are melinjo seeds (*Gnetum gnemon*) and have been shown to have the ability to ward off free radicals, diabetic and hypertensive. This review explained to improve and develop melinjo seeds flour products and increase added value by utilizing appropriate technology and diversification of processed products. This manuscript is relevant for the agriculture and food industry; the use of bioactive as a nutraceutical product has developed rapidly and might be used for human nutraceutical health applications.

Biography

Prof. Tri Agus Siswoyo, SP., M.Agr., Ph.D., in 1995 completed the Bachelor of Agriculture program at the Faculty of Agriculture, University of Jember. The master program (M.Agr.) was completed in 1999, and the Doctoral Program (Ph.D.) was completed in 2002 at Applied Biochemistry, Graduate School of Agriculture and Biological Sciences, Osaka Prefecture. University, Japan. Since 1998 he has been a lecturer and researcher at the Faculty of Agriculture, University of Jember. Research focus: Finding bioactive protein or peptides from local resources and developing them to produce protein-based supplement materials (Nutraceutical). Several research results have been published in journals (national and international), seminars (national and international), and patents. He is also active in professional associations (Indonesia Protein Society; Indonesian Association of Biochemistry and Molecular Biology, Asia Pacific Protein Association). Since 2014, He has earned the title of Professor in Biochemistry. He is currently chair of the graduate school for biotechnology and chair of the center of excellence on crop industrial biotechnology.

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Profile of Metabolic Energy & Crude Protein Content in Layer Feeds in Indonesia

Consistent fulfillment of metabolic energy and protein content in poultry feed is essential for maintaining poultry performance. In Indonesia, the main source of metabolic energy content in poultry feed comes from corn, soybean meal and rice bran with a composition of 45-55%, 20-30% and 8-25%, respectively. Corn, soybean meal and rice bran in poultry feed are not only used as energy sources, but also provide protein intake. Based on Feedstuffs Ingredients Analysis (Batal and Dale, 2016), the metabolic energy and crude protein content in corn is 3373 kcal/kg and 7.5%; in soybean meal is 2240 kcal/kg and 44.0%; and in bran is 2040 kcal/kg and 13.5%, respectively. The high demand of corn, both for food and poultry feed, as well as the high price of imported soybean meal, have increased the price of poultry feed. We have tested the content of metabolic energy and crude protein of more than 1,000 layer feed samples (end product and self-mixed feed) from various regions in Indonesia using Calorimeter and Kjehdahl methods during the period 2019 – 2021. The test results data showed that more than 50% of end product and self-mixed feeds had metabolic energy content of less than 2700 kcal/kg, where the average metabolic energy content in that group respectively was 2538.05 kcal/kg and 2524.91 kcal/kg, and the lowest metabolic energy content respectively was 2049.80 kcal/kg and 2030.53 kcal/kg. In addition, the results of crude protein content showed that more than 45% of final product and self-mixed feeds contained < 18% with an average crude protein content respectively was 16.75% and 16.45%, and the lowest crude protein content respectively was 11.22% and 7.25%. The low metabolic energy and crude protein content in layer feed can be influenced by several factors, including variations in the quality of feed raw materials, water content, varieties of plant sources and also handling of feed or feed raw materials. The increase in feed prices and relatively low feed quality are the latest challenges for the poultry industry in Indonesia. Besides the use of synthetic amino acid products in feed, comprehensive research related to the search for good, consistent and abundant sources of metabolic energy and crude protein in poultry feed is needed to overcome these challenges in order to maintain food security related to poultry products in Indonesia.

Audience Take Away:

- The audiences can find out the profile of metabolic energy & crude protein content of poultry feed in Indonesia which can be used as a benchmark to compare the nutritional profile of poultry feed in other countries
- The audiences can find out about nutritional problems of poultry feed in Indonesia so that it can be a trigger to conduct various studies to overcome these problems

Biography

Elvina Jonas Jahja studied Pharmaceutical Sciences in Ohio State University (2001) and graduated as Master of Science from University of the Pacific (2003) in the United States. She then worked in formulation department of Gilead Sciences USA for HIV treatment (2004). In 2005 she started to work for Medion Indonesia, as Research and Development Head, responsible for development of pharmaceutical and biological products mainly for poultry. In 2010 she started to manage the Pharmaceutical Products Business Unit as well. Since 2018 Elvina is also responsible for animal research activities for in-vivo testing of new products.

Zorica Tomičić[1], Ivana Cabarkapa[2], Olivera Duragic[3], Ruzica Tomicic[4]

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The adhesion of *Candida glabrata* is influenced by probiotic yeast Saccharomyces boulardii and growth conditions

Following the widespread use of immunosuppressive therapy together with broadspectrum antimycotic therapy, the frequency of mucosal and systemic infections caused by the pathogenic yeast *Candida glabrata* has increased in the past decades. Due to the resistance of *C. glabrata* to existing azole drugs, it is very important to look for new strategies helping the treatment of such fungal diseases. The aim of this study was to investigate the effect of the probiotic yeast *Saccharomyces boulardii* on *C. glabrata* adhesion at different temperatures, pH values, and in the presence of fluconazole, itraconazole and amphotericin B. The method used to assess adhesion was crystal violet staining. Our results showed that despite the nonadhesiveness of *S. boulardii* cells, this probiotic significantly affected the adherence ability of *C. glabrata*. This effect was highly dependent on *C. glabrata* strain and was either antagonistic or synergistic. Regarding the extrinsic factors, temperature did not indicate any significant influence on this S. boulardii modulatory effect, while at high pH and at increased concentrations of antimycotics, *S. boulardii* did not manage to repress the adhesion of *C. glabrata* strains.

Audience Take Away:

- Probiotic yeast *S. boulardii* can have a significant inhibitory effect on the adhesion of pathogenig yeast *C. glabrata*
- At specific strain ratios between probiotic and *C. glabrata* was observed a slight stimulative effect with some *C. glabrata* strains, which highlights the importance of strain specificity and opens further research interests to examine cell wall surfaces of tested strains, which may explain these differences
- pH and temperature seem not to be decisive factors for the interaction between *C. glabrata* and *S. boulardii*. Antimycotics on the other hand showed more impact, since *S. boulardii* did not manage to have such influence on the co-culture adhesion at higher antimycotics concentrations
- It can be speculated that *S. boulardii* could substitute the effect of antimycotics in some concentration range and with specific strain types. This would certainly change the view on treating yeast infections

Biography

Zorica Tomičić has completed her PhD in biotechnology from Faculty of Technology, University of Novi Sad, Serbia in 2018. Currently she is employed as a Research Associate at the Institute of Food Technology, University of Novi Sad. She works in a Laboratory of Microbiology and also conducts amino acids analysis by HPLC. Studying the virulence traits of pathogenic yeast and bacteria, as well as finding alternative solutions in their control and elimination such as probiotics, plant extracts, essential oils, etc. are of her special scientific interest.

Ružica Tomičić[1], Zorica Tomičić[2], Ivana Čabarkapa[3], Sunčica Kocić-Tanackov[4], Peter Raspor[5]

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[5]Biotechnical Faculty, University of Ljubljana, Jamnikarjeva 101, 1000 Ljubljana, Slovenia

Factors Affecting Adhesion Of Yeast *Candida* spp. And Pichia spp. To Stainless Steel Surfaces

Microbial adhesion and biofilm formation to surfaces is of great environmental, medical and industrial importance and consequently draws considerable attention in the last decades. The persistence of microorganisms in biofilms is a serious hygienic problem in the food industry, causing processing and post-processing cross-contamination leading to reduced product shelf life and effectiveness of sanitizing treatments as well as potentially affecting the consumer's health. Despite the research efforts devoted on bacterial adhesion, very little information is available on the adhesion behaviors of *Candida* spp. and Pichia spp. onto stainless steel surfaces, although these yeasts are usually contaminants in the food industry. Hence, in this study we investigated the impact of growth medium and temperature on *Candida* and Pichia adherence using stainless steel (AISI 304) discs with different degrees of surface roughness (Ra = 25.20 – 961.9 nm). The adhesion of the yeast strains to stainless steel surfaces grown in Malt Extract broth (MEB) or YPD broth at three temperatures (7°C, 37°C, 43°C for *Candida* strains and 7°C, 27°C, 32°C for Pichia strains) was assessed by crystal violet staining. The results showed that the nutrient content of medium significantly influenced the quantity of adhered cells by the tested yeasts. Adhesion of C. albicans and C. glabrata on stainless steel surfaces were significantly higher in MEB, whereas for C. parapsilosis and C. krusei it was YPD broth. In the case with P. pijperi and P. membranifaciens, YPD broth was more effective in promoting adhesion than MEB. On the other hand, our data indicated that temperature is a very important factor which considerably affects the adhesion of these yeast. In this study, we also evaluated the antimicrobial activity of plant extracts such as *Humulus lupulus, Alpinia katsumadai* and *Evodia rutaecarpa against C. albicans, C. glabrata* and *P. membranifaciens* and investigated whether these plant extracts can interfere with biofilm formation as well as acting on preformed biofilms. According to the MIC values, all plant extracts were effective in inhibition of yeast strains. It was observed that biofilms of C. glabrata were more resistance to plant extracts as compared to *C. albicans*. However, extracts of *A. katsumadai* and *E. rutaecarpa* were promoted the growth and development of a preformed biofilm of *P. membranifaciens.*

Audience Take Away:

- This study provides valuable information for better understanding of the adhesion behavior of *Candida* spp. and Pichia spp.on stainless steel surface.
- Gives awareness to food supply chain and environment for contamination with microorganisms capable to adhere.
- The knowledge of how these microorganisms adhere and which factors affect this phenomenon proves to be of great importance in order to avoid their colonization.

Biography

Ružica Tomičić has completed her PhD in biotechnology from Faculty of Technology, University of Novi Sad, Serbia in 2018. Currently she is employed at the Faculty of Technology, University of Novi Sad and work as a Researcher in the Laboratory of Microbiology. During doctoral studies, she had the opportunity to be involved in a research project at the Biotechnical Faculty in Ljubljana, Slovenia where she gained experience in working with pathogenic and spoilage microorganisms. As a part of her PhD thesis she studied the influence of environmental factors on microbial adhesion to biotic (such as human colon carcinoma cells HT29-MTX-E12) and abiotic (such as polystyrene, stainless steel, wood) surfaces. Antimicrobial resistance and the search for new alternative solutions such as plant extracts, essential oils and probiotics are of her special scientific interest. She is a member of Serbian Society for Microbiology and a winner of FEMS Research Grant for 2017.

Ombretta Marconi[1], Giovanni De Francesco[2*], Valeria Sileoni[3], Giuseppe Perretti[1]

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Influence of process conditions on the flavour stability of unpasteurized craft beer

Craft beer is an emerging brewing field which is more and more important in terms of production and value. Unfortunately, 2020 was an awful year for small craft breweries which seen their beers unsold for long time. Thus, to produce a stable beer is important for craft beer too. Craft beers are usually unpasteurized and unfiltered, causing a different aging behaviour compared to a pasteurized and filtered one. In this work the influence of some process conditions (e.g. microfiltration, storage temperature, refermentation with fresh yeast) on the flavour stability of a beer during 6 months of storage was studied. A golden unpasteurized top-fermented beer was used as sample. Analyses of quality parameters, volatile compounds and sugars profile were performed. Further, beers were judged by a trained panel. The samples were analysed in duplicate for a total of 36 samples. Results confirmed that cold stored (4±1 °C) refermented with fresh yeast resulted to have higher flavour stability. Beer had stable quality parameters both for cold and room stored samples. Apparent attenuation, alcohol, colour, pH, haze did not significantly change. Dissolved oxygen was reduced by the presence of yeast. Microfiltration at 0,45 µm caused a reduced foam persistence and a reduction of flavour stability. Judges found oxidation and stale descriptor only into the microfiltered beers. Cold storage contributed to preserve the hop flavour, which resulted significant different after 6 months between cold and room stored beer. The sum of aldehydes unexpectedly decreased during storage for all samples. This work highlighted an interesting flavour stability of the unpasteurized beer where the yeast can act as antioxidant during refermentation and storage.

Audience Take Away:

- The use of fresh yeast is a good option to referment craft beer
- The filtration at 0,45 µm did not give great advantages in this experimental work
- The use of cold maturation and cold storage is an optimal way to improve flavour stability of craft beer
- Beer microfiltration is a good option for small breweries, but great attention to oxygen must be paid

Biography

PhD Giovanni De Francesco studied Food Technologies and Biotechnologies at the University of Perugia, Italy and graduated as MS in 2010. He then joined the research group of Prof. Perretti and Prof. Marconi at the Italian Brewing Research Centre of the University of Perugia. He received his PhD degree in 2013 at same institution. Now He is at the sixth-year postdoctoral fellowship supervised by Prof. Marconi at the same institution. He has published more than 18 research articles with more than 130 citations. He held over than 1000 hours of frontal lessons at the professional training courses on brewing and malting production. He is a brewing and malting consultant. He is Panel leader and professional beer taster.

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Mixture design applied for formulation and characterization of vegetal-based fermented products

In recent years, dietary habits around the world have changed with the evolution of food industry. Today, there are different diets that define the eating habits of a person and/or a population. There is an emergence of new so-called alternative diets which promote a reduction in the consumption of dairy products, for health reasons like lactose intolerance and allergy problems, or for a lifestyle choice based on a vegetarian or vegan diet. The dairy products alternatives are part of the diet in many countries, particularly in Asia and Africa, and are considered as appropriate functional food, which may contain probiotics. The Western consumer, these last years, is more aware of the health benefits of plant-based diets, the sustainability of these foods and their impact on the environment. In the meantime, the food industry is interested in these products, in order to propose an issue to feed the growing world population.

Our work consists on the formulation of a fermented plant-based dessert, based on plant raw materials which must be easily accessible and can meet consumer expectations.

In the first part, we studied the chemical and physicochemical properties of six flours, ingredients considered to be very interesting for their nutritional contributions and functional properties. In the second part, we formulated and characterised a fermented plant product from three selected flours using a mixture design methodology.

We demonstrated the possibility of using the flours in the manufacture of a vegetable dessert as well as their suitability for fermentation with lactic acid bacteria, on a laboratory scale that can be extrapolated to an industrial scale. The results obtained did not require the addition of any additives and/or preservatives other than mechanical and thermal treatments. The use of a cocktail of industrial lactic acid bacteria leads to a decrease in pH close to dairy products such as yoghurt to ensure shelf life. Thus, during 4 weeks of storage, the post-acidification, colour, water retention and texture of the products obtained were evaluated at 24h, 15 days and 30 days. The data obtained using a constrained Scheffé design allowed to determine not only the individual effects of the ingredients but also the interactions between the used flours, despite the constraints imposed. The response surface methodology allowed to find the optimal formulation that meets the technical and industrial requirements, depending on the physico-chemical and textural parameters studied.

Audience Take Away:

- This study shows the importance of raw material selection and characterisation in the formulation process
- Provide an overview of the use of a mixture design in the formulation of a new food product
- We focus on the time, cost effectiveness and the possibility to study variables simultaneously with fewer observations as the most important advantages when developing a new product especially within a company
- It is a collaborative effort between a university laboratory and a food company, with the aim of linking research and food development leading to develop a process easily transferable to industrial lines

Biography

AIT chekdid studied agronomy and industrial food technologies at the Ecole Nationale Supérieure Agronomique in Algeria, and obtained her engineering degree in 2015. She then did a master's degree in Biotechnological and Food Sciences and Processes (SPBA), at the university of Lorraine in France, and graduated in 2017. She was recruited in 2018, by the St Hubert company to do a Ph.D. which allowed her to join professor Linder's research group at the LIBio lab in Nancy, France. She works on the formulation of new fermented vegetable desserts, which allowed her to publish a research article in the LWT journal.

Jamal Ali Mohamed Ehdadan
University of Benghazi, Libya

Limited of water resources drives to food insecurity during conflict period case of study Libya

Limited of water resources in Libya is main problem facing the country , The Groundwater is the main source of fresh Water in the country, WATER problem has big issues not only in Libya or North Africa but around the world , Libya is mostly arid and semi-arid covers a total of 1,759,540 square Kilometers (GAI,2008), The cultivable area of the Libyan state is estimated to be about 2.2 million hectares (1.2% of the total area) (NASID,2006, more than 80%of agricultural production achieves from irrigated agriculture, population growth is high , Rapidly increasing population in many parts of the World place growing demands on Water for agricultural, domestic, and industry use . limited arable land, and low soil fertility. Limited water resources in Libya is main reason for hinders the agricultural sector in the country. Libya depends heavily on groundwater resources 97% (Ehdadan-2018). agricultural sector facing another challenge which water is in the south (groundwater) and the arable land in the north part of country. Majority of the population and agricultural activities are concentrated in the northern part of the country where there is not enough water for them petroleum countries in the Arab world such as Libya Kuwait are heavily dependent on oil exports to support their GDP and buy food commodities by oil revenues of GDP (World Bank, 2008). Food problem in 2010 agriculture accounted for only 3 percent of Libya's GDP. Stagnation in the sector made the country highly dependent on imports. Before 2011, Libya imported 80 percent of its consumption requirements, with wheat, oil, maize, and milk comprising the main commodities sourced from abroad. EAU import about 90% of their requirements (Ameena Ali,2019) . according to FAO report, water resources will be enough to produce enough food at the global level up to 2050, but many regions will face substantial water scarcity. Water shortages will result in increased competition and agriculture sector will continue to be the largest user of water resources in most of the countries around the world and account for 70 per cent or more of water withdrawals from rivers, lakes, and aquifers (FAO, 2015) almost 1.5 billion people at the present time live in states facing conflict and food insecurity. Some other studies the conflicts are usually linked to natural resources, where some countries that are rich in natural resources, such as oil, gas, diamonds, and gold, were most plagued by conflict in the past 20 years and commodity rich countries characterized by widespread food insecurity, such as Libya, Angola, (Lean 2012; Walsh 2018). Moreover, there are many reasons why food insecurity may lead to conflicts. This can be due to food price increases and volatility.

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Saccharomyces cerevisiae uclm-3 and *Hanseniaspora osmophila* uclm-1056 as yeast active cultures for developing a functional food

Nowadays, consumers have shown a clear interest in healthy foods with functional properties. In order to satisfy this demand, the objective of this work was to propose a product enriched with a microorganism with probiotic character. For this, Saccharomyces cerevisiae uclm-3 and Hanseniaspora osmophila uclm-1056 (characterised in previous studies as probiotics) were chosen. Based on their viability and vitality after a lyophilization process, the best of them was selected to be incorporated into a food matrix. The elaborated product was subjected to a sensory evaluation by consumers.

The tests with different variables in the lyophilization process showed that the most appropriate conditions were 400 mL of biomass with 8% trehalose as a cryoprotective agent. The strain with the best results was S. cerevisiae uclm-3. Its incorporation into the matrix was carried out at a concentration of 108 cells per food portion. The product was stored at 15°C, in a dry place, and its stability was checked for 12 months, after which tests were carried out with consumers (102 participants). The triangular test showed that the majority differentiated the product with the yeast supplied from its homologous without it. However, thanks to the preference tests, it was observed that the favorite was the one that contained the probiotic. Therefore, it is shown that the use of the yeast uclm-3 with probiotic character for the elaboration of a functional food is adequate.

Audience Take Away:

- The audience will learn about the usefulness of yeasts, beyond their conventional use in the preparation of fermented foods
- It should be taken into consideration that there has been an increasing interest on probiotic microorganisms. Currently, there is only one commercial probiotic yeast, but we have found several of them with great probiotic potential and with biotechnological properties of interest. Therefore, with the present work we want to presenter two of them, selected to be incorporated to a dried food
- The presentation of the work will allow the audience to expand their knowledge about this new field of research. As well as providing information to the designer's experiment or contrasting results if they work in the same line of research

Biography

Dra. Pilar studied Food Science and Technology at the Castilla-La Mancha University, Spain and graduated in 2015. She continued with postgraduate studies, and at the same time, she joined the research group of Prof. Ana Briones Pérez at the Yeast Biotechnology laboratory in Castilla-La Mancha University. She received her PhD degree in 2019 at the same institution. Currently, she obtained a postdoctoral fellowship supervised by Dra. María de los Llanos Palop at the Microbiology Laboratory, Toledo (Spain).

Magdalena Jeszka-Skowron*, Robert Frankowski, Agnieszka Zgola-Grzeskowiak

Department of General and Analytical Chemistry, Poznan University of Technology, Poland

The influence of technological processes of coffee beans on the phenolic compounds, trigonelline, methylxanthines, nicotinic acid, and amide determined in the coffee brews by LC-MS/MS

Coffee is probably the most popular beverage in the world. Coffee, a complex of above 1000 compounds, contains caffeine and other alkaloids, chlorogenic acids among many other bioactive compounds. It is well known that the content of phenolic and other compounds in coffee is affected by coffee variety and cultivar, climatic conditions (altitude, soil, fertilization, sun exposure, temperature, rainfall), and post-harvest conditions (washing, drying, and storage). The technology of coffee beans starts from a green bean and then the coffee bean can be decaffeinated, steamed and/or roasted mainly on the three various grades (first crack, city/full city, second crack). In the case of Kopi Luwak coffee, the green coffee beans are fermented in the gut of the Asian palm civet (Paradoxurus hermaphroditus), excreted, collected, cleaned, and roasted. The aim of the study was to determine 18 bioactive compounds in Arabica and Robusta coffee brews analyzed by liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS). 5 Arabica coffees of various origins (green and roasted on 3 grades), 7 Robusta coffees (green and roasted on 3 grades, steamed and decaffeinated), and Kopi Luwak coffee (full city grade) were used as the samples. The dominating compounds of all analyzed coffees were caffeine and trigonelline. From chlorogenic acids' groups of compounds: 5-caffeoylquinic acid, 4-caffeoylquinic acid, 3-caffeoylquinic acid as well as 3,5-caffeoylquinic acid, 3,4-caffeoylquinic acid, and 4,5-caffeoylquinic acid were determined and it was found that the technological processes significantly influenced the quantity of these compounds. Nicotinic amide and acid were determined in all analyzed coffee brews. Kopi Luwak coffee possessed one of the highest levels of bioactive compounds among Vietnam (Robusta), Brazil, and Uganda Bugishu (Arabica) coffees.

Audience Take Away:

- Influence of technological processes of coffee on green coffee beans (Arabica and Robusta coffees of various origins),
- Difference between the chemical composition of selected coffee types subjected to roasting, decaffeination, steaming processes, and fermentation (Kopi Luwak coffee)
- Usage of LC-MS/MS in coffee science

Biography

Dr. Jeszka-Skowron studied Food Commodity Sciences at the Poznan University of Economics, Poland and graduated with an MSc. Eng. in 2006. She received her Ph.D. degree in 2012 at Poznan University of Life Sciences in the field of Food Chemistry. Then she joined the research group of Prof. Zgoła-Grześkowiak at the Institute of Chemistry and Electrochemistry, Poznan University of Technology, Poland where she is working till now as an adjunct. She has published more than 25 research articles in SCI(E) journals, 3 chapters in books, and one book as an Editor.

Shashi Vemuri* and G.Venugopal
Formerly at Prof. Jayashankar Telangana state Agricultural University University, Hyderabad, 500030 India

Challenges To Food Security

Food security is access to enough food by all people at all time for an active and healthy life. As per FAO Food security exists when all people at all times have both physical and economic access to sufficient, safe, and nutritious food. An increasing global population, in combination with climate change is a threat to food security as arable land becomes more scarce. The Global population which is 6.1 billion by 2000 is projected as 9 billion by 2050. The Growth in the agriculture sector is an effective tool to achieve food security and reduce poverty. Investing more funds in agricultural research and development are key for increasing agricultural productivity. For achieving zero hunger Governments and the private sector need to reenergize their science and technology research capacities. Otherwise Global efforts to achieve the zero hunger 2030 could fall short. Worldwide Investment in agricultural sciences is on the decline for many years. We need 60 percent more food to feed a hungry world by 2050 to meet 9 B. This needs to come from smallholder farmers who produce a majority of the world's food. Efforts to leverage science and technology in the field of agriculture must involve everyone. Need to develop the capacity for innovation in small holder farmers. The skills and capacities of all key players involved in all aspects of the agricultural innovation system must be upgraded through education and training at all levels. Small holder farmers need an enabling environment for innovation including good governance, stable macro economic conditions, transparent legal and regulatory regimes, secure property rights, risk management tools and market infrastructure, India is truly developing now and income, infrastructure, per capita income has also developed. However the major problem is food management and it's distribution. Most efforts to reduce hunger concentrate more on agricultural production. Food losses due to a variety of issues are addressed less (biological, chemical and physical forces). Despite ensuring ample availability of food, existence of food insecurity at the micro-level in the country has remained a formidable challenge for India. Malnutrition and poverty are the main causes for the adoption of food security in India. Globalization may and may not help food security. Many people feel that globalization will definitely help food security due to trade but its matter of debate.

Audience Take Away:

- The different issues in the food security are essential to overcome the problem including food safety
- The social economical and other factors like ethnical all play a role in the food security including the govt policies
- This involves social and economics faculty along with pesticide residues analysts and food and nutrition to work together
- A detailed analysisof the existing scenario, the country policies, the food habits of the population, their purchasing ability the local factors, the weather factors, staorage, transport and marketing etc play a big role

Biography

Prof. Shashi Vemuri was Formerly Senior Professor/ principal scientist and university head of entomology in India. with specialization in Pesticide Residues, Insect Toxicology, food safety and food security issues and worked for more than 36 years indifferent capacities as Professor/ Researcher and Extension scientist. He/has published more than 130 research articles, 4 book chapters He has published more than 35 papers in reputed journals. Participated in more than 45 International Conferences and member of various Professional Committees and organizations.

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Impact of Drought on the Physical and Cooking Properties of Six Common Bean Genotypes in Puerto Rico

Grain legumes, such as common beans, are a significant part of the global food system and a substantial source of protein and carbohydrates. In the diet of Puerto Ricans, common beans represent an essential component. However, several factors can limit their production on the island: competitive import prices, biotic and abiotic stresses such as drought. Drought has a direct influence in physical and cooking properties of common beans which affects consumer acceptance. The objective of this study was to analyze the effect of drought on physical and cooking properties of a subset of six out of thirteen common bean genotypes grown under a non-stressed (NS) and drought-stressed experimental plots (DS) in Puerto Rico. Selected seeds used in this experiment were collected and stored at freezing temperatures. For each genotype, dimensions, color, bulk density, and true density were determined. In addition, hydration capacity, swelling capacity, cooking time, and gruel solid loss procedures were carried out. Dimensions of five out of six studied genotypes were affected by drought conditions. Pinto beans had the greatest values of length (10.85 - 11.90 mm), thickness (6.35 - 7.02 mmm) and width (4.64 - 5.22 mm) regardless of treatment. Most of the color parameters observed for each of the six common beans genotypes were not significatively different between the NS and

DS treatments. Bulk and true density values were higher in black beans genotypes compared with navy and pinto beans. There was no significative effect of drought treatment on bulk and true density comparing the same genotype in the two studied conditions. Similarly, NS and DS treatments did not exhibit differences in porosity. However, one of the navy beans showed differences between DS treatment (38.56%) and NS treatment (35.90%) in their porosity values. High values of hydration capacity were observed in genotypes under NS treatments of black and pinto beans, ranged from 0.21 to 0.23 g/seed and from 0.28 to 0.33 g/seed, respectively. Swelling capacity was not significatively different for black and navy beans in regard of treatments. Nevertheless, pinto beans under NS treatment exhibited greater swelling capacity (0.28 – 0.32 mL/seed) than DS treated pinto beans (0.25 - 0.28 mL/seed). In terms of cooking times, black beans genotypes had the lowest times (29.61 - 9.50 min) whereas navy beans had the highest values (43.17 - 26.28 min) regardless the treatment. Although NS treatments had lower cooking times (40.61 - 26.00 min) than DS treatments (43.17 - 28.39 min), it is worth mentioning the cooking times of the navy beans exhibited shorter cooking times under the DS treatment (40.33 min) than NS treatment (43.00 min). Gruel solid loss ranged between 9.99 to 5.30 %, 8.63 to 5.80 %, 8.11 to 4.06 %, for black, pinto, and navy beans, respectively. Cooking and physical properties of grain legumes can be affected by drought; however, some genotypes develop attributes to overcome these effects and show acceptable quality in terms of color, dimensions, and cooking times..

Audience Take Away:

- Physical and cooking properties of some grain legumes can be minimally affected by abiotic stressors like drought and heat

- The importance of the identification of genotypes of grain legumes that can ensure acceptable quality of legumes in regions with regular dry cycles in agricultural production
- Grain legumes minimally affected by abiotic stressors represent an opportunity to mitigate hunger in those countries where legumes are the main staple food

Biography

Carmen E. Pérez-Donado graduated in 2015 from Universidad del Atlántico at Barranquilla, Colombia, with a B.S. degree in Agroindustrial Engineering. After two years working in the food industry, she decided to pursue a M.S. degree in Food Science and Technology at University of Puerto Rico in Mayaguez. Since then, she has worked in different research projects involving physicochemical and nutritional characterization of starchy crops and grain legumes

Natalie N. Rivera-Agosto[1]* and Rosa N. Chavez-Jauregui[2]

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Development of an Extruded Product using Stem and Rootstock from Apio Criollo (Arracacia xanthorrhiza).

Apio criollo (Arracacia xanthorrhiza) grown in Puerto Rico has a unique structure with three distinctive fractions: stem, rootstock and storage roots. The main component of this root-crop is carbohydrates, but from a nutritional viewpoint it represents a good source of fiber. The rootstock is commonly consumed boiled in artisanal dishes; however, the stem and storage root are not fully exploited. The aim of this study is to provide an alternative to Arracacia xanthorrhiza perishability through dehydration process and extrusion cooking while incorporating both rootstock (75%) and stem (25%). The raw material of Arracacia xanthorrhiza was processed into flour for the determination of physicochemical properties, thermal properties and the development of the expanded snack. Amylose and amylopectin content, available starch and sugar content were determined. A single screw laboratory extruder and a central composite rotatable design were used, where the independent variables examined were feed moisture (10 to

14%) and temperature of the barrel central zone (140 to 160°C). The extrusion was optimized by response surface methodology (RSM). Pre-extrusion flavoring technique was used by adding aroma precursors cysteine (0.2g/100g) and butyric acid (0.4g/100g) to the flour 24 hours prior to extrusion. After extrusion, salt (1.0g/100g) and sunflower oil (6g/100g) were added to the snack. The protein and fiber content obtained for the apio criollo flour ranged from 2.12% to 6.69% and 1.93% to 2.20%, respectively. The available starch content for stem and rootstock were not significantly different. In terms of the thermal properties determined, initial and final gelatinization temperatures for stem and rootstock were 54.3°C and 63.5°C, and 53.1 °C and 61.4°C, respectively. The highest expansion index and best texture were obtained at feed moisture content of 11% and central zone temperature of 150°C. This study showed that Arracacia xanthorrhiza flour can be used as a substitute to conventional flours in the development of products with higher nutritional value. Moreover, it was demonstrated that through conditions that promote the maximum expansion ratio, extrusion cooking and pre-extrusion flavoring produced a highly acceptable expanded snack based on apio criollo.

Audience Take Away:

- Arracacia xanthorrhiza can be used in the development of new products
- The importance of pre-extrusion flavoring as an alternative to traditional flavoring methods
- Based on this study, the stem and rootstock of Arracacia xanthorrhiza can be utilized in thedevelopment of expanded snack products

Biography

Natalie N. Rivera-Agosto graduated in 2019 from the University of Puerto Rico at Mayagüez with a B.S. degree inIndustrial Microbiology with a Food Science and Technology emphasis. Since graduating, Natalie is pursuing a M.S. degree in Food Science and Technology with a thesis directed towards Food Chemistry at UPR-Mayagüez Campus.

Gomez-Chang, E.[1]*, Miranda A.[1], Galvez-Mariscal, A.[2], Romero, I.[1]

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Antiulcer properties of *Anoda critstata*, a Mexican edible "quelite"

Anoda cristata (commonly known as Alache), belongs to a group of comestible herbs known as "quelites" in Mexico, which comprise leaves, stems flowers or inflorescences of young and tender annual green plants that are traditionally eaten raw, lightly cooked or fried. Approximately, 500 species of quelites are consumed in Mexico, and the importance of these plants lies in their nutritional richness in terms of their content in vitamins, minerals, fatty acids and antioxidant compounds. In addition to their nutritional value, their consumption is of great relevance as part of the local traditions of different ethnic groups, since these plants may constitute the main component of certain dishes or provide a variety of textures, aromas and flavors. Moreover, some of these species are traditionally used for the treatment of digestive disorders.

Gastrointestinal diseases such as peptic ulcers, represent a public health problem worldwide, since they can affect up to 10% of the world's population. The chronic consumption of NSAID's and the infection by the Gram-negative bacteria, H. pylori, are the two main etiological factors associated to this disease. Current therapies are mainly directed towards the eradication of H. pylori or the pH gastric modification. Despite the available treatments, the rates of therapeutic failures and relapses are high, mainly due to adverse effects of prolonged therapeutic schemes and their high costs.

Previous studies have demonstrated the anti-*H. pylori* properties of two extracts [Aqueous (AQ) and dichloromethane-methanol (DM)] obtained from three species of quelites (*A. cristata, Cnidoscolus aconitifolius and Crotalaria pumila*). The DM extract of A. cristata, exhibited a good inhibitory effect against *H. pylori* and upon one of its colonization factors (adhesion). The AQ extract of *A. cristata* contained mucilage (Ala- Mu), which was also tested.

With this background, we decided to study whether the anti *H. pylori* activity is preserved when preparing a traditional dish consumed with this quelite and, if the mucilage of alache has a gastroprotective potential.

The alaches dish was prepared according to a traditional recipe. It consists of a broth with fresh plant. Water is added to be boiled for 30 min. The stewed broth was dried and pulverized for its usage in the trials. Subsequently, its DM extract was obtained and assayed in vitro against H. pylori growth. The gastroprotective effect of Ala-Mu was tested in an ethanol-induced gastric ulcer model in mice.

The results showed that the thermal treatment of alache, promoted an increase in the growth-inhibiting effect of H. pylori by the DM-extracts. The Ala-Mu exhibited a good gastroprotective activity.

Collectively, the data presented, give important information about the anti-*H. pylori* effect of the selected comestible species, and very importantly, it shows that, under a thermal treatment, just in the same way that dishes are usually prepared with these plants, the inhibitory effect upon the bacterial growth increased. These findings provide the basis for further studies that include the evaluation of the impact of routine consumption of species as a way to prevent and control peptic ulcer or its etiologic agents.

Biography

Dr. Erika Gomez-Chang is a Medical Doctor graduated from the National Autonomous University of Mexico. She developed her thesis at the Department of Biochemistry and received her PhD degree in 2014 at the same institution. She performed a postdoctoral stay in the Department of Toxicology, at the Center for Research and Advanced Studies of the National Polythechnic Institute. Previous research: "glycosylation of neuronal proteins", and "transduction pathways associated to steroidogenesis". At the present time, she collaborates in the research work of Dr. Irma Romero, which focuses on the study of the anti-*Helicobacter pylori* potential of Mexican medicinal plants.

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POSTERS DAY 1

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SEP 30-OCT 01, 2021

FAT 2021

Heba Althubaiti
Home Science Education Department - Nutrition Unit, Umm Al-Qura University, Makkah, Saudi Arabia

Examining Saudi Students Perception on snacks healthiness and preferences in Umm AlQura University

Introduction: Saudi Students perception of snack healthiness, and preferences is unknown. This crosssectional study aim to examine students perception on snack preferences and snack healthiness and to determine goals and factors that affect their choice of snacks.

Method: Saudi Students from Umm Al-Qura University (n = 209, age between 18 - > 25 years old) participated in this study. All data (general and demographic data) were collected using an online survey. Two snack ranking questions were asked and presented along with one portion size images of different healthy / unhealthy snack types (n =17). The two snack ranking questions (from most to least) were focused on examining students perception on snack healthiness and snack preferences for them. The ranking order of the snack questions was replaced by nutritional composition (energy, sugar, fat and salt content values) of each type of these snacks and used in the analysis. The mean for the top five snack choices by students was used in the analysis.

Result: Students preferred some snacks more than others as they ranked Raisins (13.7 ± 3.45) and date biscuit (12.1 ± 3.62) the most preferred type whereas the least preferred type was Apple (4.8 ± 4.16). Students were not able to determine the healthiest snack based on their ranking score as they ranked Apple the least healthy snack (2.2 ± 2.37) whereas the chocolate bar was the highest healthy snack in the mean (14.1 ± 3.95) amongst all of the 17 snack types. Satisfying hunger (62.8%), based on their preferences (42.2%), as alternative for a main meal when it is the main meal time, (22.1%), as a reward for them (16%), and high nutritional value (13%) were the most reported snack goals by students. 34% of students reported to have two snacks per day and 6% have no snack at all. The students reported that snack taste (60.1%), snack availability (36.8%), snack price (29.8%), environment (27.7%) and friends (26.2%) were the most factors affecting their snack choice. No significant relationship were found between students' age and their mean ranking score of energy content of their snack healthiness, this suggest that students from different ages were the same in determining the healthiness of snacks However, positive relationship was found between students' perception on snack preferences and their age which suggest that older students had more preferences to snack high in energy content. No significant relationship was found between students' perception of snack healthiness and their snack preferences. This means that students had their own preferences, which differed from their perception of healthiness. When students were asked to rank the 17 snacks according to their preferences, there was a significant positive relationship between students' ranking score and energy content. This shows that students had more preferences to the snacks with higher energy content. There was no significant relationship between students ranking score of snack healthiness and their energy content. This shows that students had no knowledge towards snack healthiness.

Conclusion: Students demonstrated a low level of awareness on snack healthiness as shown in this study. Promoting healthy snack eating behaviour in students from different ages is important and needed by future research, and to clearly understand the surrounding environment which acts as a catalyst .

Audience Take Away:

- Use similar technique to the one that I used in my study in order to collect data. For example, using the nutritional composition of all snacks in the analysis
- Presenting ranking questions along with colored images to specify the snack type that used in the research
- This research has been already conducted among Scottish childre and their parents in Aberdeen in 2015 so it is a continuous research now among Saudi students but it is still a very good opportunity for other society to investigate their perception on snack preferences and healthiness and to moveforward to increase the awareness regarding snack choice particularly among children at early age
- As this study is a cross sectional one it does collect data regarding students perception on snack from different aspects and therefore present where the problem is now whether in their choices/ other factors that may affect their snack choice

Biography:

Dr. Heba Althubaiti studied Human Nutrition at Aberdeen University, Scotland and graduated in Apr 2018, I got my MSC in Nutrition and food science in Nov 2011 from Heriot Watt University, Scotland. I work as Assistant Professor in Umm Al-Qura University, Saudi Arabia. During my PhD I joined the Energetic Group of Prof John Speakman in Aberdeen University (School of biological Science). I have presented two studies during my PhD in two conferences which held by Nutrition Society. I have published 4 research articles and working on my current project which discuss Saudi students and the academic Staff about their percept on on snack preferences and healthiness.

Malgorzata Szczepanek[1]*, Wojciech Kozera[2], Tomasz Knapowski[2], Edward Majcherczak[2], Rafal Nowak[1], Aleksandra Bech[1], Maciej Baczynski[1]

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[2]Department of Agricultural Chemistry, University of Science and Technology, Seminaryjna 5 str.,85-326 Bydgoszcz, Poland

Mineral content and protein quality in ancient wheat grain (*Triticum sphaerococcum* and *T. persicum*) from organic farming

The need for a balanced supply of food with a high nutritional value is the biggest stimulus that leads to increased interest in the primary forms of wheat. The cultivation of primary wheat forms (emmer wheat, einkorn wheat, spelt wheat), gives a chance to obtain consumption grain with a higher content of biologically active components than in common wheat. However, the quality characteristics of other ancient wheat species are not recognized. The aim of this study was to analyze the content and quality of protein and minerals in the grain of little-known ancient wheat species – Indian dwarf wheat (*Triticum sphaerococcum* (Perc.) and Persian wheat (*Triticum persicum* Vav. (=*T. carthlicum* Nevski). The study was carried out under the project entitled 'Innovation in cultivation, processing and marketing of primary forms of wheat – Indian dwarf wheat and Persian wheat with increased nutritional value' implemented by the 'Ancient Grain' operational group. This project is co-financed from EU funds, in the main funding source Rural development 2014-2020 for Operational Groups. Primary wheat grain collected for qualitative assessment came from strict field experiments established in 2019, at three organic farms located in different regions of Poland. Studies have shown that Persian wheat and Indian dwarf wheat grain was characterized by a higher content of minerals such as P, Cu, Zn and Fe than in common wheat. The studied ancient wheat species were also distinguished by an increased (by 9-17%) content of total protein in grain and flour. Moreover, the protein had a higher biological value. An increased concentration of essential amino acids, such as isoleucine, leucine, phenylalanine and arginine, has been found. Based on the results obtained, it can be concluded that ancient wheat species such as Indian Dwarf wheat and Persian wheat obtained from organic farming can be a valuable raw material for the production of food with increased nutritional value.

Audience Take Away:

- The audience will gain new information about the quality characteristics of the grain of unknown ancient wheat species (Indian dwarf wheat and Persian wheat).
- The information obtained may be an inspiration for a broader study of the nutritional value of products obtained from grain or flour of ancient wheat.
- Teaching staff can incorporate issues related to primary cereal species into curricula.

Biography:

Malgorzata Szczepanek (PhD, Eng.) is employed in the position of Assoc. Prof. at the Department of Agronomy at her home university. She focuses mainly on the development and implementation of innovations, scientific research, popularization and dissemination of knowledge as well as academic education in the field of agricultural sciences. Prof. Małgorzata Szczepanek has worked in the following research areas: field crops, vegetables, sustainable agriculture, cropping system, seed production, biostimulants, nutrient management, crop quality, crop storage. She is the author of more than 100 research articles published in international journals and conference proceedings. He has also delivered speeches at various international conferences. She is a breeder of three wheat cultivars and a co-creator of patents. Currently, she is the manager of the "Ancient Grain" project, which aims to restore the use of primary wheat forms with increased nutritional value. The project won the first place in the competition for innovative projects, co-financed from EU funds, with the main funding source Rural development 2014-2020 for Operational Groups. She has been the vice-president and/or the member of scientific and organizational committees of national and international conferences (Singapore, South Korea, Turkey). She is also a member of the editorial committee of the journal Agronomy Basel (Q1, IF 2.56).

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KEYNOTE FORUM | DAY 2

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Weicheng Wu* and Xiao Fu

Key Lab of Digital Land and Resources and Faculty of Earth Sciences, East China University of Technology, Nanchang, Jiangxi, 330013, China

Analysis of the impacts of natural disasters on food production by remote sensing taking Jiangxi, China as an example

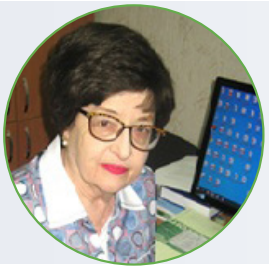
Natural disasters, typically, drought and flood, exert direct impact on crop growing performance and productivity. The objective of this research was to conduct such an impact analysis using meteorological, statistic and multi-resolution remote sensing data taking Jiangxi, China as an example. We first calculated the Standardized Precipitation Index (SPI) based on the monthly rainfall data from 83 meteorological stations of the period 1960-2020 covering the whole province to identify the drought and flood years. Then time-series MODIS vegetation data, digital elevation model (DEM) and its derived slope were employed to define the staple food, i.e., the paddy plantation area of three different cropping rice, namely, early rice (Apr-July), middle cropping rice (Jun-Sept) and late rice (Jul-Oct) by Decision-tree approaches using Landsat images and Google Earth for verification. And then, an exploration on the relationship between the vegetation indices such as NDVI, EVI and LAI and the reported rice yield (Y) was conducted to build remote sensing-based yield model. Results show that among the all the test models, those coupling the accumulated county-level average of the peak NDVI of three cropping rice of the period from 2014 to 2019 with the reported county-level annual mean rice yield are most effective for estimating the annual rice yield of each year for the whole province. The derived models are shown as follows: $y = 106489.574+0.01x+9.231E\text{-}11x^2$ (R^2= 0.894) or $y = 93087.727+0.015x$ (R^2 = 0.888), where y is the predicted county-level annual total rice yield and x the accumulated county-level peak NDVI of three cropping rice. With these models, the predicted province-level annual rice yield is in a good agreement with the government reported annual rice yield with a little difference of about 0.59-2.18%. Taking 2019 as an example, the predicted county-level annual yield is well consistent with the reported county-level annual yield, that is, $Y_p = -1889.157 + 0.966X_r$ (R2 = 0.885), where Y_p is the predicted county-level yield and X_r the reported county-level yield. As revealed by SPI analysis on the rainfall data from 1960-2020, it is noted that in the very recent five years' period, 2016 and 2017 were the normal years while 2018 was flooded and 2019 suffered from both flood and drought. In comparison with 2016 and 2017, we found that a reduction of 50,000 and 910,000 t of rice production in the province respectively in 2018 and 2019. We also noted that the government had slightly overstated the rice production by about 161,000-262,000 t in these two years. In conclusion, SPI-based analysis and time-series of remote sensing processing and modeling allow us to achieve staple crop yield prediction and analyze the impacts of natural disasters on the former.

Audience Take Away:

- The audience will learn how to analyze the drought and flood in terms of time-series rainfall data, and how to use remote sensing data to identify crop plantation and predict its production from this work
- Yes, the audience may employ the methodology in their research or teaching
- This research provide a solution for food security analysis

Biography:

Dr Weicheng Wu received his PhD in Environmental Geography from the University of Paris I-Pantheon-Sorbonne, France in 2003. After one year post-doctoral fellowship in the Ecole Pratique des Hautes Etudes in Paris, and he joined the University of Sassari in Italy as university researcher in 2005. After an international competition, he became the remote sensing specialist at the International Center for Agricultural Research in the Dry Areas (ICARDA)/CGIAR as international scientist in 2007. At last, he joined the East China University of Technology in Nanchang, China as full time professor in 2018. He has published more than 90 research papers in SCI/SCIE journals.



Pavlovskaya N.E

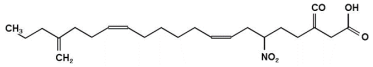
Key Lab of Digital Land and Resources and Faculty of Earth Sciences, East China University of Technology, Nanchang, Jiangxi, 330013, China

Field crops as a source of biologically active substances for crop production

The Ministry of Agriculture of the Russian Federation, the Federal State Budget Educational Institution of Higher Education "Orlov State Agricultural University, N.V. Parakhina, Department of Biotechnology. G. Eagle, Russian Federation.

Field crops: Barley *Hordéum vulgáre*, oats *Avena sativa* and buckwheat *Fagopýrum esculéntum* contain biologically active metabolites with stimulating, fungitoxicity and adaptable properties on which plant biological control tools for harmful plants are created and tested Organisms. From the roots of oates isolated avenacin, from the grain of barley gordecin, from leaves and buckwheat flowers the sum of bioflavanoids (quercetin, routine, chlorogenic acid). All of these metabolites have antioxidant properties. Avenacine is a plant antibiotic found in maximum quantities in the roots of sowing ove. The roots of the oat contain 4 groups of avenacines: A-1, A-2, B-1, B-2, the main of which is avenatein A-1 (70%). Avenacin (10-11M-10-12M) stimulates root formation and has antimicrobial action on Staphylococcus aureus, Pseudomonas aeruginosa, E.coli and fungitoxic properties against Fusarium oxysporum. The effect of avenation on the growth processes of peas has been investigated. High concentrations of avenation (10-6M) act depressingly on the development of plants in the initial stages, slowing the growth of roots. The treatment of avenaten peas in nanoconcentrations (10-10M-10-12M) has a stimulating effect on root formation. In addition, under the influence of avenationin there is a stimulation of the root formation of peas infected with Fusarium oxysporum, 2.3 - 5 times, which indicates its fungitoxic properties.

Gordecin is C25N39O7N, an in-orcitha nitrococarbonic acid. With the proposed structural formula:



Inhibition of root growth of healthy pea sprouts treated with gordecine in concentrations of 10-8-10-10 M, compared to control by 2.5 times. With the decrease in the concentration of the antibiotic, the length of gordecine-treated roots increases. Infection of Fusarium oxysporum of pea seeds and treatment with gordecin leads to an increase in root length compared to control by 2.3 to 2.7 times and recovery of plants, which is probably due to the selectivity of the action of gordeskin aimed at the pathogen.

In the leaves and flowers of buckwheat in large quantities contain routine, quercetin, chlorogenic acid, and in the roots of epicatechin, possessing antioxidants properties. From buckwheat straw, a product called RutiFlav was obtained, which is one of the components in the composition of the composition for presowing treatment of pea seeds (RF patent No. 2463759). The invention relates to agriculture and biotechnology. Using the obtained product by soaking and / or spraying pea seeds, it is possible to increase the immunity of the plant. As a result of pre-sowing treatment, the development of root rot decreases by 15%, the moth damage by 5%, while there is an increase in pea yield by 15-20%, depending on the stability of the genotype and the conditions of the year. The more stable the variety and the more favorable weather conditions for the development of plants, the less is the increase in yield when processing the drug; the less stable the variety and the worse the conditions of the year, the higher. The use of a drug in combination with chemical pesticides in field crop cultivation technologies reduces the dose of the latter by half. Buckwheat bioflavonoids have antioxidant, fungicidal and bacteriostatic properties. Thus, active metabolites isolated from plant tissues of field crops can be included in the integrated control of pests and diseases.

The presentation presents a scheme for the isolation of avenacin from the roots of oats, gordetsin from barley grain and the sum of bioflavonoids from the leaves and flowers of buckwheat. In Petri dishes with the Fusarium oxysporum seeded fungus and the disc method, the result of the fungitoxic effect of these metabolites is demonstrated. On the seeds and seedlings of peas, barley and wheat, the growth-promoting effect of metabolites is shown, data from field studies showing the effect of metabolites on the photosynthetic productivity and yield structure of a new preparation based on buckwheat bioflavonoids are presented.

Audience Take Away:

- The presentation will present specific materials on the scheme for the isolation of active metabolites from three crops and a demonstration of their fungitoxic effect on the root rot pathogen, Fusarium oxysporum, growth-promoting action on the germination energy and development of pea, barley and wheat seeds, and increasing the yield of grain and leguminous crops
- Plants, like all living organisms, strive to survive and preserve their offspring from destruction, so they developed a biological weapon with which to protect their offspring. Such compounds include antinutrients, which can be dangerous not only for insect pests or pathogens, but also for humans. These include lectins, phytates, alkaloids, etc. But there are those about which little is known, but they are no less dangerous for animal organisms (hordecin, avenacin, some phenols). It all depends on the dose and time of exposure. In small doses, you can use them to create not only medicines, but also tools that will become an alternative to chemical pesticides in the fight against harmful organisms in crop production
- Biologically active plant metabolites in the process of evolution are created by nature as a chemical weapon against other organisms and contribute to their preservation in a competition for survival. A biologist can use this property to create natural remedies as an alternative to chemical pesticides and thereby contribute to the transition of all agriculture to an organic basis

Biography:

Dr. Pavlovskaya N.E. studied biology at Tashkent University, which she graduated in 1961, worked at the Institute of Experimental Plant Biology of Uzbekistan, where she defended her dissertation in plant biochemistry in 1969, worked there as a research associate, and in 1987 she defended a doctorate at the Institute of Biochemistry named after A.V. Palladium in Kiev, NAS of Ukraine. In 1994, she moved to the Russian Federation in the city of Oryol, where she works as the head of the department of biotechnology. She prepared 32 candidates of sciences and 2 doctors. Pavlovskaya N.E. published more than 300 scientific papers, received 15 patents for plant protection products, copyright certificates for varieties of cotton, peas and barley.

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SPEAKERS DAY 2

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Debolina Sarkar[1,2*], Ashley Garrill[1,2], Volker Nock[2,3]

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[3]The MacDiarmid Institute for Advanced Materials and Nanotechnology, Wellington 6140, New Zealand

A step toward preventing Oomycete's infection through the modification of electric fields on a microfluidic device

The oomycete *Phytophthora* can cause serious threats to native flora and agriculture and food biosecurity, causing devastating diseases to plants such as kauri, oak, avocado. In New Zealand, *Phytophthora agathidicida* is the causative agent in kauri dieback and is receiving much coverage in the mainstream press as it can kill a mature kauri tree within two years. These organisms can infect their host plants via motile zoospores. These can travel between sites of infection via water in the soil.

So far, the research focused on mimicking the natural environment around the roots of the plant using microfluidic Lab-on-a-Chip (LOC) devices to investigate the electrical parameters that allow zoospores to infect plant roots. LOC devices can contain channels and chambers that allow the growth of microorganisms and the applications of physical and chemical factors. The optical properties of the devices allow me to monitor the growth and behaviour of the microorganisms in response to these factors. Plant roots can generate electric fields, which may attract zoospores. Different LOC devices have been designed that contain anodes and cathodes, which enable the study of the swimming behaviour of *Phytophthora* zoospores in the presence of different strength electric fields. Experimental result shows that zoospores tend to swim preferentially towards and then aggregate close to the cathode. These zoospores encyst and germinate, and the resultant germ tube shows chemotactic growth, also toward the cathode.

Modification of these devices will allow concurrent measurement of electro-tactic and chemotactic responses. These new devices will incorporate channels that allow the application of plant cell wall extracts, in addition to the applied electric fields. What will the response of the zoospores be, for example, if the wall extracts are applied close to the cathode – will the zoospores be more attracted to the electrical or the chemical stimulus? This research will help address the question of what the primary attractant directs infectious zoospores towards the roots of a plant. It will help in developing techniques to prevent infection. For example, if the electric fields were the primary attractant, it may be possible to design small field-based devices that are able to modify electric fields around vulnerable plants and attract zoospores away from roots and thus reduce their infective capability.

Biography:

She received a bachelor's degree in Science from the Department of Microbiology, Calcutta University, India, in 2015, and a master's degree in Microbiology from the University of Pune India, in 2017. She did her master project on determining the antioxidant and anti-microbial property of *Piper cubeba*. She is currently enrolled as a PhD researcher in the School of Biological Sciences, University of Canterbury, New Zealand. Her work focuses on the microfabrication of Lab-on-a-Chip devices to study the movement of *Phytophthora* zoospores under the influence of electric fields and to investigate means of stopping their movement.

Ghulam Zakir-Hassan[1,2] *, Faiz Raza Hassan[1], Ghulam Shabir[1] and Haroon Rafique[1]

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Irrigated agriculture and groundwater nexus under changing climate- a case study from Punjab, Pakistan

Groundwater in Pakistan underpins the food-security and livelihood especially in rural areas in Punjab province of Pakistan by playing a vital role in irrigated agriculture. Groundwater provides a buffer against supply-based canal water supplies and drought conditions. It is also source of drinking, industrial and other commercial needs. Use of groundwater has increased manifolds since last 4-5 decades and Pakistan has become 4th largest user of groundwater in the world. At present about 1.2 million private tubewells are extracting groundwater to supplement about 40-50% of the irrigation water requirements. Groundwater levels data from around more than two thousand piezometers in the Punjab province have been analysed for last 8 years both from rural as well as urban areas to evaluate the long-term response of Indus Basin Aquifer to the increasing pumpage. It has been observed that groundwater levels are dropping at very rapid rates in most of the areas at the rate ranging from 0.5 ft to 3 ft per year. This has increased the cost of pumping logarithmically. At the same time, quality of groundwater is also deteriorating with the passage of time. This situation is leading to many environmental and socio-economic threats putting livelihood of multitude of tinny rural communities under risk. Major drivers for groundwater over-mining include increasing population; uncertainty in availability of surface water-both spatial and temporal; increasing cropping intensities; deterioration of aquifer quality-due to domestic, agricultural and industrial effluents; lack of regulatory framework; lack of awareness and capacity constraints. This paper encapsulates the causes and trends of groundwater depletions, some remedial measures, and some initiatives taken recently by the government for its sustainable use.

Audience Take Away:

- Extensive use of groundwater has ranked Pakistan as 4th largest extractor of groundwater globally
- Groundwater in Punjab province of Pakistan underpins food security and livelihood
- Major consumer of groundwater in Pakistan are agriculture, domestic and industrial sector
- Agriculture is the largest consumer of groundwater where more than 90% water resources are diverted

Biography:

Mr. Zakir-Hassan is working as Director Research at Punjab Irrigation Department Lahore, Pakistan. He obtained M. Engg, degree from Asian Institute of Technology, Thailand and currently is a PhD scholar at Charles Sturt University, Australia. He has more than 25 year experience in the applied and basic research fields related to a wide spectrum of water sector issues. Has international exposure by visiting different countries including Thailand, PR China, Saudi Arabia, Australia, Iran, India, UAE, Nepal, Indonesia. Mr. Zakir is member of different national and international professional organizations like Pakistan Engineering Council, Institution of Engineers Pakistan; EWRA, Pakistan Engineering Congress; AIT Alumni Association; Aus-Awards Pakistan; ILWS-CSU, IAH; International Water Resources Association (IWRA).

Eva YuHua Kuo[1] and Tse-Min Lee[1,2]*

[1]Department of Marine Biotechnology and Resources, National Sun Yat-sen University, Kaohsiung 80424, Taiwan,
[2]Doctoral Degree Program in Marine Biotechnology, National Sun Yat-sen University, Kaohsiung 80424, Taiwan

NADPH oxidase-mediated signaling pathway mediates the high light activation of ascorbate-glutathione cycle (AGC) in *Chlamydomonas reinhardtii* against photo-oxidative stress

The ascorbate-glutathione cycle (AGC) is essential for *Chlamydomonas reinhardtii* cells to cope with high light stress. NADPH oxidase acts as key hub for the regulation of stress tolerance in plants. High intensity illumination (HL, 1,200 mol m-2 s-1) did not impact Chlamydomonas growth while the application of diphenyleneiodonium (DPI), a NADPH oxidase inhibitor, in the concentration of 5 or 10 M inhibited cell growth along with an increase of reactive oxygen species (ROS, O2.-, H2O2, and 1O2) and lipid peroxidation. The RNA-seq analysis and enzyme activity assay reveal that HL triggered an increase in CAT, APX, DHAR and GR enzyme activity and FeSOD (FSD1), APX1, DHAR1, and GSHR1 transcript abundances. But, the increase in the transcript abundances of APX1 and GSHR1 by HL was enhanced in the presence of DPI. The induction in the activity of enzymes in AGC can be inhibited in the presence of 10 M DPI, accompanied with increased ROS production. However, the increase in the transcript abundances of FSD1, APX1, DHAR1, and GSHR1 under HL condition can be enhanced in the presence of DPI. It reflects that NADPH oxidase-mediated signaling pathway modulates the induction of AGC in the ways other than mRNA level. In conclusion, the present findings demonstrate that NADPH oxidase modulates the upregulation of ascorbate-glutathione cycle for the acclimation of Chlamydomonas cells to photo-oxidative stress.

Audience Take Away:

- The role of NADPH oxidase in the regulation of antioxidant defense system has been not well studied in algae
- The present study reveals that NADPH oxidase is associated with the modulation of antioxidant defense system in *Chlamydomonas* against high light stress

Biography:

Dr. Tse-Min Lee studied Agronomy at the National Taiwan University, Taipei, Taiwan and graduated as MS in 1984. He then joined the research group of Prof. Chun Chu at the Institute of Agronomy, National Taiwan University, Taipei, Taiwan. He received his PhD degree in 1990 at the same institution. After four year postdoctoral fellowship supervised by Drs Hsieh and Lin at the Acadmia Sinica, Taipei, Taiwan, he obtained the position of an Associate Professor at the National Sun Yat-sen University, Kaohsiung, Taiwan. He has published more than 80 research articles in SCI(E) journals.

Aparna B. Gunjal
Department of Microbiology, Dr. D.Y. Patil, Arts, Commerce & Science College, Pimpri, Pune, Maharashtra, India

Plant growth promoting rhizobacteria in agriculture

The use of chemical fertilizers in agriculture for the plant growth is very harmful and causes water and soil pollution. The biological approach is very eco-friendly, easy and economical. The plant growth promoting rhizobacteria are beneficial bacteria that are useful in agriculture. They have plant growth promoting traits viz., production of iron chelating compounds called siderophores; plant hormones Indole Acetic Acid (IAA), Gibberellins and Cytokinins; solubilization of phosphorus and potassium; production of enzymes, etc. The plant growth promoting rhizobacteria can be useful in agriculture to increase the crop yield. The plant growth promoting rhizobacteria include *Burkholderia, Acetobacter, Herbaspirillum, Serratia, Bacillus* sp., etc. The biological approach to increase the plant growth will also be sustainable. The pot experiments have shown these plant growth promoting rhizobacteria are found to improve seed germination, root and shoot length, vigour index, etc. This will be ultimately helpful to the farmers in agriculture.

Biography:

Dr. Aparna B. Gunjal has completed her B.Sc. from Annasaheb Magar Mahavidyalaya, Hadapsar; M.Sc. from Modern College Arts, Commerce and Science College, Ganeshkhind and Ph.D in Environmental Sciences subject from Savitribai Phule Pune University, Pune, Maharashtra, India. She is working as Assistant Professor in Department of Microbiology at Dr. D.Y. Patil, Arts, Commerce and Science College, Pimpri, Pune, Maharashtra, India. Her research areas of expertise are solid waste management; plant growth promoting rhizobacteria; e-waste management; bioremediation; etc. Aparna has 95 publications to her credit. She has received 15 Awards for the Best Paper presentations and also received the travel grants. Aparna has also received Pune Municipal Corporation Award for excellent work in Environmental Sciences Research in 2015, The Elsevier Foundation - TWAS Sustainability Visiting Expert Programme" in 2018 and Young Researcher award with Innovative Technology. She has worked on composting aspect as a Senior Researcher Assistant at Hongkong Baptist University, Hongkong. Aparna is Reviewer for many Journals.

Charu Lata*, Pramod Prasad, O.P.Gangwar, Sneha Adhikari, Subodh Kumar, S.C. Bhardwaj

ICAR-IIWBR, Regional Station, Flowerdale, Shimla, H.P., India

Transcriptional regulation of defense responsive genes during wheat-stripe rust interactions

Stripe or yellow rust disease of wheat is caused by *Puccinia striiformis* Westend. f.sp. *tritici* (Pst) is a global threat to wheat production. Populations of Pst pathotypes evolves rapidly, limits the efficiency of plant genetic resistance and constrict the strategies of disease management. Molecular mechanisms that lead the infection and spread of disease could convey the novel strategies for deployment of rust resistance in wheat. Genetic modifications of defense responsive factors under compatible interactions could be one of the way to produce resistance towards emerging virulent pathotypes. The present study is planned to understand the interaction between Pst pathotype 78S84 in PBW 343 and FLW-3. A quantitative temporal transcription profile of selected defense related genes (caffeic acid O-methyltransferase (*COMT1*), class III peroxidase (*PRA2*), Type 1 non-specific lipid transfer protein precursor (*LTP1*), chlorophyll a/b-binding protein WCAB precursor (*WCAB*), aquaporin (*AQP1*), β-1,3-glucanase (PR1 and PR2), endochitinase (*PR4*), peroxidase (*PR9*) and phenylalanine ammonia-lyase (*PR10*)) was analyzed at different time course of infection. Under compatible and incompatible interactions, at different time course after inoculation differential expression pattern of genes was observed which indicated the different transcription levels of defense related genes in response to pathogen attack. Under compatible interactions, most of the genes were upregulated at initial time points and then transcription levels of the genes were declined. Nevertheless, under incompatible interactions transcription level was higher from 3 to 24hpi, which is considered as the favorable time for appressorial hyphae, haustorial mother cell development and formation of feeding structure. Genes *LTP, AQP1, PR1, PR2, PR4* and *PR10* confer pre-haustorial resistance under incompatible interactions. On other hand, *COMT1, PRA2, WCAB* and *PR9* genes showed higher transcription level at later stages and governs post-haustorial resistance. Under compatible interactions *LTP, AQP1, PR1, PR2, PR4 and PR10* genes performed well and showed higher transcription efficiency while under incompatible interactions transcript levels of *COMT1, PRA2, WCAB* and *PR9* genes were found significantly high. Results of this study clearly depicted the role of defense responsive genes with progression of disease under compatible and incompatible interactions.

Biography:

Charu Lata (PhD) is currently working on molecular aspects of wheat rust interactions. She had done her graduation and post-graduation in Biotechnology. In 2013 she joined ICAR-CSSRI, Karnal at division of Crop improvement. She received her PhD degree in 2019 from Kurukshetra University, Kurukshetra, Haryana, India. She joined Indian Council of Agricultural Research as scientist and posted at ICAR-Indian Institute of Wheat and Barley Research, Regional Station, Flowerdale, Shimla (HP), India. She has published 25 research articles in NAAS rated journals, 2 book chapter and more than 10 popular/technical articles.

Laura Martins de Carvalho
Center for Public Administration and Government / FGV-SP, Sao Paulo, SP, Brazil

Urban Agriculture in socially vulnerable areas of Sao Paulo, Brazil and in Lisbon, Portugal

Urban Agriculture can enable possibilities to combat structural inequalities in contexts of social vulnerability, providing: income generation; improvements in the quality of life of urban farmers; expansion in the production and access of food suitable for human consumption; and environmental preservation. In this direction, this presentation shows part of the results of research conducted in a socially vulnerable area of São Paulo, Brazil and Lisbon, Portugal. The findings for São Paulo are: (a) the growing female protagonism in agroecological urban agriculture, associated with popular entrepreneurship and the awareness of the injustices that female urban farmers face; (b) the disputes among community garden´s management models and cultivation concepts; (c) informality in access to land for urban agriculture and no guarantees of permanence in the community gardens' lands. The findings for Lisbon are: (a) Urban Agriculture is highly regulatory, materialized in the Horticultural Parks project conducted by Lisbon´s City Council; (b) untapped potential for mobilization and popular participation of urban farmers in social districts; (c) untapped potential for social-environmental innovation in initiatives led by the youth. The study concludes that the AU activity, in the studied contexts, causes a wide improvement in the quality of life of urban farmers; initiates or expands local production of food suitable for human consumption by vulnerable populations; urban agriculture practices are associated with environmental preservation and the promotion of environmental awareness through pedagogical practices. In short, urban agriculture – materialized in activities of an emancipatory, assistance or regulatory nature – has the potential to combat structural inequalities faced by vulnerable populations, contributing to social and economic transformations in large cities.

Audience Take Away:

- The audience will be able to use the insights regarding the different types of urban agriculture practices led by civil society organizations in socially vulnerable areas; the potential for mobilization and popular participation of urban farmers in social districts; and the social-environmental innovation led by the Youth involved in urban agriculture initiatives
- Scholars, civil society organizations, public servants, practitioners, and policy makers will benefit from the presentation, as multiple stakeholders produce urban agriculture in socially vulnerable areas – each with distinct agendas and interests
- Civil society organizations offer local solutions to complex social problems in socially vulnerable areas such as income generation; access to healthy food in areas of food apartheid; environmental preservation; environmental education; and women emancipation from structural inequalities and violence

Biography:

Laura Martins de Carvalho has a PhD. in Global Health and Sustainability (Faculty of Public Health – University of Sao Paulo, 2021); a Master of Science in Environment and Development (Trinity College Dublin, 2012); and a BA in Social Sciences (PUC-SP, 2007). Her research topics are on urban agriculture in socially vulnerable areas, popular entrepreneurship; urban agroecology; women empowerment through urban agriculture. She is experienced in conducting and coordinating research in disadvantaged urban communities of São Paulo, Brazil; Dublin, Ireland; Lisbon, Portugal; and in rural communities in Rwanda, Africa. She currently a research assistant at the Center for Public Administration and Government / FGV-SP and looking for potential collaborators.

Edgar Omar Rueda Puente
The Antonio Narro Agrarian Autonomous University, Mexico

The reconversion of agriculture in arid and desert areas at level word

The reconversion of crops refers to the change of product or activity that allows a better use of the soil, favors its fertility and breaks the biological cycles of pests and diseases to have an effective control and prevent them from becoming immune or resistant. Therefore, this change, whether of product or activity, represents greater economic profitability and social viability for the producer, because comparative and competitive advantages are taken advantage of, and products with value can be offered in the internal and external markets. The types of conversion that can be carried out are: change from an annual crop to another of the same cycle; change from annual crops to perennials, for example, in the area of cultivation that was destined for cereal to establish in its place a certain fruit tree, another example is when annual seasonal crops are intercropped by grasslands. Likewise, there may be shift changes between the different productive sectors, for example, when moving from an agricultural activity to a livestock or from a livestock to a forestry one.

Biography:

Dr. Edgar Rueda studied agronomy at Universidad Autonoma Agraria Antonio Narro in Saltillo, Coahuila Mexico and graduated as MS in 1996 at same institution. He received his PhD degree in 2004 at CIBNOR in California, Mexico. Currently Dr Rueda is working in Universidad de Sonora into the Agriculture Departament. He has published more than 100 research articles in SCI(E) journals

Elizabeth Kordyum*, Dmutro Dubyna
Institute of Botany, National Academy of Sciences of Ukraine, Kyiv, Ukraine

Role of Phenotypic Plasticity for Plant Adaptation to Varying Environments

The problem how plants as a sessile organisms survive in the varying environment, including adverse changes remains one of the most urgent of modern biology, especially in connection with forecasts of climate global change and increased man-made pressure.

We discussed the available views about numerous types of plant life strategies and mechanisms of competition and coexistence in plant communities in the light of an adaptive essence of phenotypic plasticity and its ecological significance.

In our opinion, 1) types of plant adaptive life strategies characterize only biological and ecological traits of species (cenotic types) in modern phytocenoses. Under the changes of environmental factors of natural or anthropogenic origin, plants of different cenotic types reveal phenotypic plasticity, similar in general terms, to adapt and survive in new conditions. Under the strategy of life (a life cycle), we understand the immanent ability of all living organisms to propagation, that is, the implementation of the "reproductive imperative" –- leaving offspring and preserving a species. Epigenetic systems contribute substantially in plant plasticity and adaptation to the environment due to their ability to vegetative propagation, annual growth of perennial plants (presumably clones), and apomictic propagation – adventitious embryony and apospory; 2) interrelations of sessile and autotrophic organisms eliminate competition for resources. Plants product the organic matter from water and carbon dioxide thanks to energy of sun light and a green pigment chlorophyll. Thus, plants are the first link that combines inorganic and organic worlds and underlies the further trophic chains of heterotrophic organisms in the biosphere; 3) inorganic resources needed for photosynthesis and respiration as sun light, carbon dioxide and oxygen in atmosphere are unlimited. Water and bioelements are available to all sessile components of the phytocenosis. Sunlight intensity is really different on the open area, above the canopy and under the canopy of trees. But each habitat in nature with different sunlight intensity and spectrum is occupied by plant species which the photosynthetic apparatus adapted to these conditions and works effectively; 4) coexistence (facilitation, complementarity) of species, not competing for resources, is the main mode of complicated interrelations of plants in modern phytocenoses, which exist throughout the history of mankind. Coexistence of plants in phytocenoses is conditioned by the biological peculiarities of cenotic types, namely by differences in life (morphological) forms and types of root systems, duration of ontogenesis, reproduction systems, sequence of seasonal development as well as the level of adaptive phenotypic plasticity in response to various environmental changes – climatic, seasonal and meteorological. Range of plasticity reflects the ecological and biological peculiarities of the species that make phytocenoses, their different attitude to the environment, and to each other. Just coexistence of species different on biology and ecology provides stability of phytocenoses and, thus, stability of the plant cover on Earth; 5) Restriction ideas about plant competition for resources will increase attention to other aspects of plant relationships as the basis of their coexistence in natural communities.

This report presents the original views of the authors, which can be used in discussions about the role of phenotypic plasticity in plant adaptation, specialization, population dynamics, and the interaction of plants with the environment in general.

Biography:

Dr. Edgar Rueda studied agronomy at Universidad Autónoma Agraria Antonio Narro in Saltillo, Coahuila México and graduated as MS in 1996 at same institution. He received his PhD degree in 2004 at CIBNOR in California, Mexico. Currently Dr Rueda is working in Universidad de Sonora into the Agriculture Departament. He has published more than 100 research articles in SCI(E) journals

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Yolander Youngblood, Ph.D.*, Ineceia Carter, and Ayanna Montegut

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Case Study: A Ten percent Acetic Acid Solution is Successful as a Growth Control Agent against Glyphosate Susceptible and Glyphosate Resistant *Amaranthus palmeri* (Palmer Amaranth) when plants are young and short

In this preliminary study we investigate the responses of Glyphosate-Susceptible and Glyphosate-Resistant Amaranthus palmeri to an organic 10% acetic acid herbicide solution. Traditional herbicides are glyphosate-based. Overuse of these herbicides has led to glyphosate resistance in some plants. Amaranthus palmeri is one of them. We hypothesized that although both forms respond differently to glyphosate-based herbicides, both respond the same to organic-based herbicides that include acetic acid. In this study a 10% acetic acid solution was used versus the standard 20% acetic acid solution found in the organic agricultural vinegar herbicide because previous studies suggest that at a very young age (plants are less than ten centimeters tall), the 10% solution is strong enough to control growth. Using a lesser concentration is better for the environment since there will be less buildup over time. Using less is also less costly to the farmers' pocket. In the greenhouse Amaranthus palmeri was grown in 24 pots using Carolina® Seed Starter mix. The seeds were loosely placed in the soil about an inch from the top. Once 2 to 8 leaves per plant were apparent, the young Glyphosate-Susceptible and Glyphosate-Resistant Amaranthus palmeri leaves were sprayed with a 10% acetic acid solution. These plants are C4 plants and thus have stomata on their adaxial and abaxial leaf surfaces. Most leaves have stomata only on their abaxial surfaces. Using the JEOL Scanning Electron Microscope (SEM) we noted that stomata start responding to stress within two hours. The leaf surfaces of both plants respond the same way. Death starts to occur within 24 hours for both plant forms. The SEM micrographs show that stomata are open on the adaxial surfaces of both plant forms before they are treated. After treatment, the plants become stressed and the stomata close. However, there is a difference in the death rate. Eighty five percent (85%) of the Glyphosate Susceptible plants died within 24 hours, while 100% of the Glyphosate-Resistant plants died within 24 hours.

Biography:

Dr. Yolander Youngblood received her BS degree in Biology from the University of Southern Mississippi, USA, in 1986. She received her MS degree in Botany from the University of South Florida, USA, in 1993. In 1999 she received her PhD. in Botany from the University of Florida, USA. Currently, her laboratory is researching *Amaranthus palmeri* at Prairie View A & M University, USA, where she is a faculty member. She studies and characterizes the structural and cellular responses of leaves to certain environmental conditions, including organic herbicides. Her research is funded by the National Science Foundation.

Sellamuthu Prabakaran[1]*, Michael Alexander Gomez Cruz[2] and Mara Ivette Cano Velasquez [3]

[1]Associate Professor, School of Economics and Business Administration, Department of Accounting & Finance, Pontificia Universidad Javeriana Cali. Cali, Colombia.
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Stochastic option pricing model for rainfall derivatives – A case study of sugarcane production in valle del cauca, Colombia

Sugarcane is one of the most important commercial crops and it is the most valuable crop as it is the basic raw material for the manufacture of sugar, ethanol and jaggery. Sugarcane cultivation was started in Indian Subcontinent which was exported to other countries. Colombia is the world's second largest non-centrifugal sugar producer in the world. The primary source of water for agricultural production for most of the world is rainfall and water are the key input to agricultural production and therefore fluctuations in water availability may impact agricultural productivity and revenue. Climate change and agriculture are interrelated processes, both of which take place on a global scale. Global warming affects agriculture in a number of ways, including through changes in average temperatures, rainfall, and climate extremes (e.g., heat waves); changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone concentrations; changes in the nutritional quality of some foods; and changes in sea level. In the past decade, the literature on weather derivatives has focused on the temperature market because most traded weather derivatives are based on temperature indices. Several economic sectors, however, are exposed to rainfall risk. For example, farmers and financial investors are affected by indirect losses caused by scarce or abundant rainfall. With rainfall derivatives, firms have the possibility to transfer precipitation risk to the capital market. The main goal of this study is to construct the Stochastic Option Pricing Model and valuation approach of Rainfall Derivatives in Valle Del Cauca, Colombia Sugarcane market and to develop a flexible framework for modelling and pricing rainfall risk. The main goal of study is fourfold: 1) First, we begin our approach to brief introduction to rainfall derivative market. 2) We construct the mathematical for making bond with rainfall derivative financial derivatives (rainfall options). 3) Then, we extend this approach to focus on valuation of option pricing model. 4) Finally, use the 10 years historical data from rainfall station, Valle Del Cauca, Colombia, study and evaluate the option pricing model. In addition, this paper ends with conclusion.

Cox, Christina F., Winters, Ana, L. and Palmer, Sarah A.
Institute of Biological, Environmental and Rural Sciences, Aberystwyth University, Wales

Protein extracts as a biorefining product from the forage grass species Dactylis glomerata

D. glomerata (Cocksfoot) has previously been highlighted for having elevated protein contents, in comparison to other forage grass species. The biorefining of such proteins is of interest within British agriculture, as both costs and CO2 emissions from soy imports used as a livestock feed supplement could be reduced. The presented research will explore how protein contents determined by near-infra red spectroscopy (NIRS) compare to protein yield (quantified via Lowry assay) following a TCA/phenol/SDS extraction method, in freeze dried leaf tissue sub-samples cut from thrice replicated yield plots in August 2020. The estimation of total protein per hectare (NIRS and extracted) can be calculated as a product of dry matter yield, giving indication of protein yields from biorefining. Further analysis of extracted protein curds on PAGE gels will reveal the amino acid composition across four commercial varieties and eight half-sib families, identifying differences and similarities between genotypes. If substantial differences in amino acid profile are observed between genotypes, the quality of a protein extract from Cocksfoot could be dependent on the commercial variety sown, which requires consideration when cultivating the grass as a biorefining crop. This could also lead to further investigation into the genetic influence on amino acid profile and exploration of any potential improvements through selective breeding. This research is funded through the Joy Welch charitable trust.

Audience Take Away:

- Knowledge of total extractable protein yields gives indication of the biorefining potential of protein from D. glomerata
- Presented data could inform further research into scalability of protein biorefining
- Protein extracts have the potential to reduce the need for imported soy, lessening environmental impacts and improving on-farm income

Biography:

Christina first graduated with a BSc(Hons) in Plant Biology from Aberystwyth University, Wales in 2016. She remained within the Institute of Biological and Rural Sciences to study her PhD in Cocksfoot breeding for biorefining, which she has recently successfully defended during her viva voce. During her candidature, Christina gained an Associate Fellowship to the Higher Education Academy through undergraduate teaching in addition to working part-time for the Royal Society of Chemistry, delivering spectroscopy workshops to secondary school students. She now works within the Germinal Ltd. forage breeding team at Aberystwyth University.

[1]Roveda G*, [2]Moreno L.p., [3]Magnitskiy S

[1]Researcher, Ecodanimar SAS, Tabio, Cundinamarca

[2,3]Professor National University of Colombia – Bogotá

Effect of inoculation with Acaulospora and Glomus on growth and nutrition of Blueberry plants (*Vaccinium corymbosum*) with different fertilization levels

In recent years the demand for blueberries worldwide has been growing, due to the nutraceutical properties of the fruit that generate important benefits for human health. Colombia, due to its diversity, has a great opportunity to meet the demands of the world market. In the present study, the effect of two arbuscular mycorrhizal fungi (HFMA), of the genera Glomus (Glo) and Acaulospora (Aca) associated with blueberry plants var. Biloxi when growing on three levels of fertilization (100, 50 and 0%). The results indicate that blueberry plants inoculated with HFMA (Glo) under conditions of nutritional stress (50HFM1 +) presented an increase in dry mass (DM), plant height (AP), basal branches (RB), leaf area (AF) and root / part area ratio (R / PA), with increases in chlorophyll concentration, with statistically significant higher values with respect to treatments without inoculation with nutritional stress (0HFM- and 50HFM-). The plants inoculated with (Glo) achieved an increase in AP, while those inoculated (Aca) increased in RB, when they grew under nutritional stress in relation to the control without inoculation. The results suggest that the best association of blueberry occurs with Glomus with increased growth and nutrition (N, P, K, Ca, Mg and S).

Keywords: Blueberries, Glomus, Acaulospora, nutritional stress, mycorrhizae

Biography:

Dr. Gabriel Roveda Hoyos from the National University of Colombia, with a master's degree from the University of Wales, United Kingdom and a specialist in remote sensing applied to natural resources. Researcher and professor with 30 years of experience (CORPOICA) in the areas of agriculture, ecophysiology and microbiology and soils, with an emphasis on aspects of natural resource conservation, sustainable production and food security. I participated in the design of research, development and technological innovation proposals for Latin America, in research groups of entities such as: CORPOICA, FEDESARROLLO, public and private universities, in the integration of innovation processes with government agencies and production companies. I have worked in networks, institutional nationally and internationally with agencies such as MinColciencias, Ministry of Agriculture and Rural Development, World Bank, European Union (INCO I and II program), Procitrópicos and design of collaborative projects between countries such as Brazil, Venezuela, Peru, Guyana and Colombia. He has been a member of the International Commission on Science and Technology for Integrated Land Management, UN, Geneva and Montreux, Switzerland. I participated in forums, workshops, general policy debates and joint actions for sustainability strategies in Latin America. Co-author of publication in books / reports with around 70 scientific publications.

Manja Bozic[1]*, Ana Nikolic[1], Dragana Dudic[2], Dragana Ignjatovic-Micic[1], Jelena Vancetovic[1] Nenad Delic[1], Bojana Banovic Deri[3]

[1]Laboratory for Molecular Genetics and Physiology, Maize Research Institute„ Zemun Polje", Belgrade, Serbia

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atpI expression in different developmental stages of maize during chilling

Improving yield potential, crop quality and abiotic stress tolerance have always been some of the most important requirements for successful crop production. Poor environmental conditions arising as repercussions of climate change, like the drastically higher temperatures and drought during the summer, have become a significant cause of productivity and yield loss. Therefore, many strategies are focused on minimizing their negative effects, like changing the cropping patterns, including earlier sowing (early spring). Maize is especially sensitive to extreme heat occurring during the flowering and grain filling stages in summer, and earlier sowing enables avoiding this. However, it also means exposure to suboptimal temperatures and chilling stress during earlier developmental stages, leading to a demand for the development of maize lines tolerant to low temperatures during those stages.

In this study, 46 maize lines used in breeding programmes were grouped as Lancaster and group consisting of different heterotic groups like BSSS, Iowa dent, etc. and further studied by whole transcriptome sequencing (maize leaves, V4 stage, optimal temperature conditions). Gene expression analyses revealed a set of 77 differentially expressed genes (DEGs) between the two groups, out of which 20 were annotated as related to abiotic stress response. ATP synthase CF0 A subunit gene (atpI) was chosen for further characterization under low temperature conditions in two inbred lines (L1, L2) with most contrasting FPKM values, one belonging to each group. The experiment was performed with 5-day old and V4 maize seedlings, under optimal (25°/20°C) and low (8°/10°C) temperature conditions, with a 12h photoperiod. Samples for RNA extraction, cDNA synthesis and qPCR expression analysis were taken after 6h and 24h exposure to experimental temperatures.

The results showed different expression regulation of atpI dependent on cold exposure duration, developmental stage and genetic background. atpI expression was up-regulated in both genotypes in V4 stage, with the expression peak after 6h of treatment. In the 5-day old seedling stage, atpI expression depended on the genotype – it was down-regulated in L1, and up-regulated in L2. The expression in both genotypes in this developmental stage was at its highest after 24h of treatment. This suggests that mechanisms involved in ATP synthesis and photosynthetic phosphorylation are differentially regulated based on low temperature exposure duration, developmental stage and genetic background.

What will audience learn from your presentation?

- Bringing light to mechanisms involved in the chilling response in the early developmental stages of maize is crucial for finding and creating molecular tools that can be used further to assist in maize breeding and selection. Additionally, using atpI expression for this purpose can also be applied in the same way in other plant species.
- Since, maize is the one of the most important crops worldwide, lessening the negative effects of climate change on its production is of global importance. Finding ways of quickly and accurately predicting the maize inbreds tolerant to these changing conditions and the introgression of these traits into more susceptible genotypes is crucial. Confirming the role of atpI in the abiotic stress response could mean its inclusion in maize breeding programs, through marker assisted or possibly genomic selection, and creation of maize hybrids with superior traits.

Biography:

Manja Bozic studied Biology at the University of Belgrade and graduated as MS of Plant Physiology and Molecular Biology in 2018. She started working on her PhD research shortly after joining the Laboratory for Molecular Genetics and Physiology, Maize Research Institute „Zemun Polje". She is currently working there as a research trainee and focussing on abiotic stress factors affecting maize gene expression, and how it further affects their growth and production.

HJ du Plessis[1]*, BA Egan[1], R Kleynhans[2]

[1]Department of Biodiversity, University of Limpopo, Sovenga, Limpopo, South Africa,

[2]Department of Horticulture, Tshwane University of Technology, Pretoria, Gauteng, South Africa

Characterization of Hibiscus coddii subsp. barnardii, an endemic South African species with ornamental potential

South Africa is known globally for its rich plant biodiversity and various centres of endemism, of which the Sekhukhuneland Centre of Plant Endemism (SCPE) is one. This unique floristic region is located on the ultramafic and mafic rocks of the Rustenburg Layered Suite of the Bushveld Igneous Complex. *Hibiscus coddii* subsp. *barnardii* is a particularly attractive endemic plant species growing only on the rocky outcrops of this region. This study provides information on the plant characteristics, growth conditions in its natural habitat and other plant species most commonly found in association with this endemic. The plant is a branched perennial herb with hairy leaves that produces attractive red flowers during the summer season and small, hairy seeds after pollination. These sun-loving plants occur mostly in the dry northern bushveld part of the SCPE where they are restricted to dark-colored harzburgite, pyroxenite and norite rock ridges and can withstand periods of drought. These traits make it an ideal plant for the dry South African conditions and other areas of minimal rainfall, where water-wise gardening is becoming more popular and necessary. In nature,

H. coddii subsp. barnardii plants were found to grow in soils with high levels of Mg, Fe, Ca, Ni and Cr, although in this study, they were also grown as pot plants or small shrubs in an outside garden under diverse environmental- and soil conditions. This shows that the wild *H. coddii subsp. barnardii* species can be cultivated and has the potential to be introduced to the horticulture market as a new ornamental species due to its striking appearance and water-wise properties. The research contributed further to the establishment of suitable protocols for the *ex situ* propagation and conservation of this valuable plant.

Audience Take Away:

- Be informed of the unique characteristics of an endemic South *African Hibiscus* species and its natural habitat
- Gain insight into the potential of this species as a new flowering ornamental plant in the horticulture market
- Be introduced to the importance of *ex situ* propagation methods for the commercial cultivation and conservation of the species

Biography:

Helena du Plessis completed her undergraduate- and MSc study at the University of Pretoria. She has been affiliated with the University of Limpopo since 1996 and was involved with management of various academic and administrative activities and lecturing to under- and postgraduate students in mycology, ethnobotany and plant physiology fields. She also has experience in supervision of postgraduate students in these fields. Her doctoral research was on indigenous plants of Limpopo province, South Africa with possible horticulture potential under the supervision of Prof RV Nikolova. She received her PhD degree from the University of Limpopo in 2020 with three articles stemming from this research.

Kelli G. Thorup[1]*, Kristopher A. Blee[2]

[1]Department of Biological Sciences, California State University, Chico, California, USA

[2]Department of Biological Sciences, California State University, Chico, California, USA

Isolation of plant-growth promoting rhizobacteria from mixed-conifer forest in Sierra Nevada, California

Climate change enhances the occurrence of extreme weather: wildfires, drought, rising summer temperatures—all of which dramatically decline forest growth and increase tree mortality in the mixed-conifer forests of Sierra Nevada, California. However, microbiota living in mutualistic relations with plant rhizospheres have been found to mitigate the effects of suboptimal environmental conditions. It is the goal of this research is to isolate native beneficial bacteria—plant-growth promoting rhizobacteria (PGPR)—that can alleviate heat stress in *Pinus ponderosa* and *Pseudotsuga menziesii* seedlings. Bacteria was isolated from the rhizosphere of *P. ponderosa* juveniles located in mixed-conifer stand, and further characterized for PGP potential based on ability to produce key growth regulatory phytohormones including auxin, cytokinin, and gibberellic acid. Out of ten soil samples taken, sixteen colonies were isolated and qualitatively confirmed to produce indole-3-acetic acid (auxin) using Salkowski's reagent. These bacterial isolates were further analyzed to quantitatively assess auxin, cytokinin, and gibberellic acid production through a variety of spectrophotometric assays. Furthermore, bioassays will be performed to determine isolates abilities to increase tolerance in heat-stressed Pinus ponderosa and Pseudotsuga menziesii seedlings. Upon completion of this research, a PGPR could be utilized to support the growth and transplantation of conifer seedlings as summer temperatures continue to rise due to the effects of climate change.

Audience Take Away:

- The practical uses of bacteria in the forest industry and their potential to be used for promoting growth in seedlings. Bacterial supplementation can act as an alternative to nutrient rich fertilizers that negatively impact surrounding fresh water ecosystems
- How to efficiently isolate and screen for plant-growth promoting rhizobacteria from the rhizosphere of juvenile conifers. The process of sampling and screening can be applied to many other plant species including those of agricultural interests
- Highlights novel bacteria previously unknown as plant-growth promoting rhizobacteria due to lack of research in mixed-conifer microbiomes
- Highlights the importance of symbiotic relationships to tolerate various environmental conditions as the effects of climate change are continuing to be studied

Biography:

Ms. Thorup studies Biological Sciences in the Master's program at California State University, Chico under the supervision of Dr. Blee and plans to graduate in 2022. Previous to her master's program, she spent four years at the same institution earning her BS, double majoring in Cellular and Molecular Biology and General Microbiology, and graduated in 2020. As an undergraduate, she joined the research group of Dr. Tran in 2018 to study coral symbiosis, and later joined Dr. Blee's laboratory group in 2019 to study bacterial transformation.

Darya H arshkova*, MSc, Monika Majewska, MSc, Elzbieta Zielinska, PhD and Anna Aksmann, PhD

Department of Plant Physiology and Biotechnology, Faculty of Biology, University of Gdansk, Wita Stwosza 59, 80-308 Gdansk, Poland

Short-term exposure to Diclofenac cause adverse effects on Green Alga *Chlamydomonas reinhardtii*

The popular nonsteroidal anti-inflammatory drug diclofenac (DCF) is one of the most common contaminants of the water environment. Its toxicity to non-target organisms is often reported to be associated with long-term (chronic) exposure. However, our results suggest that DCF can cause harmful effects even during short-term treatment. The objective of the work was therefore to estimate the acute effect of DCF on green alga *Chlamydomonas reinhardtii*, which is an accepted model of research at the physiological, biochemical and molecular level.

To achieve the goal mentioned above, *Chlamydomonas reinhardtii* CC-1690 was treated for 6h with DCF in concentration equal to the toxicological parameter EC25/24 (25% inhibition of population growth after 24h of treatment). We have found that DCF caused oxidative stress in treated cultures, in which the level of H2O2 produced by the cells reached 176% of control. Even though DCF caused no effect on the photosynthetic oxygen evolution, the detailed analysis of parameters of chlorophyll a fluorescence in vivo (OJIP test) revealed that DCF decreased the photosynthetic "vitality" of the cells (P.I. parameter) by 20% as compared to control and diminished the fraction of active PS II reaction centres (RCM parameter) by 17% as compared to control. However, when energy flux through each particular active reaction center (RC) was considered, it appeared that in DCF-treated cells the energy absorption (ABS/RC), energy trapping (TR0/RC), and electron transport (ET0/RC) were unchanged, while non-photochemical energy dissipation (DI0/RC) tend to increase. The above is in a line with our previous finding, that DCF cause transformation some RCs into "heat sinks" (silent reaction centres) while the other ones retain the same activity as in the control conditions. As regards mitochondrial activity, respiratory oxygen consumption in DCF-treated cells tend to increase (about 140% of control), however, the mitochondrial membrane potential (MMP) decreased by 17%. According to literature data, this effect could be caused by uncoupling of substrate oxidation and ADP phosphorylation and an increase in oxygen consumption via the diminishment of the constraining effect of the proton gradient on electron transport.

In conclusion, we have found that DCF can cause rapid, adverse effects on green algae cells. Oxidative stress symptoms as well as disturbance in photosynthetic and respiratory processes were seen already after 6h of exposure which indicates, that DCF poses a real threat for green algae not only due to chronic, but also acute exposure to this drug.

Acknowledgements: *This work was partially supported by the National Science Centre Poland [grant UMO-2019/35/B/NZ9/01567].*

Audience Take Away:

- Non-steroidal anti-inflammatory drugs represent a large part of pharmaceutical contaminants in aquatic environment
- One example, diclofenac (DCF), is commonly found in freshwater reservoirs and can have adverse effects on green algae, due to photosynthesis and respiration disorder
- The assessment of the physiological and biochemical effects of DCF on Chlamydomonas reinhardtii, during short-term experiments, indicate that DCF poses a real threat for green algae not only due to chronic, but also acute exposure to this drug

Biography:

After graduating from master's studies in Biological Chemistry in Belarus, I continue my education on doctoral studies at the Faculty of Biology at the University of Gdansk (Poland). The area of my scientific interests are biochemical aspects of the toxic effects of chemical substances on the cells of living organisms. While continuing my toxicological research, I changed the research model, which is currently unicellular alga Chlamydomonas reinhardtii. As part of my research, I estimate the impact of pharmaceuticals on a algal cultures using different biochemical and physiological methods. I'm author and co-author of more than 10 articles and conference papers, I did several domestic and foreign internships.

Rocha Valdez Juan Leonardo*; Rocha Quinones Juan Leonardo; Ávila Cisneros Rafael; Gonzalez Avalos Ramiro; Rodriguez Dimas Norma

Antonio Narro Autonomous Agrarian University of the Department of Basic Sciences of the Highway to Santa Fe and Periférico Raúl López Sánchez S / N, Col. Valle Verde, Torreón Coahuila Mexico

Effects of climate change on the development of beans (Phaseolus vulgaris L.) in the Lagunera region.

Climate change has in some way affected the temperature of the environment, so that the increase in heat, the decrease in the rainy seasons, as well as the presence of early frosts and / or the anticipation of late frosts are considered among other factors. that can affect the development of the bean crop (Phaseolus vulgaris L.)

Method: The research was carried out in an experimental field of the Antonio Narro Autonomous Agrarian University in the city of Torreón Coahuila Mexico located in the San Antonio de los Bravos ejido, three different varieties of beans were used: Pinto Centauro, Pinto Saltillo and Pinto Bravo through a randomized block design with three replications each, where three sowing dates were made with an interval of 7 days. The first sowing date was May 22, 2020, the second sowing date was May 29, 2020 and the third sowing date was June 5 to generate an approximate projection of 170,000 plants per hectare.

Result: The ANOVA method for a single factor was used to compare seed germination, vegetative development of plants and bean production. It was validated with the Tukey test with a reliability of 95 percent. Obtaining that there is a significant difference in the production of beans and in the vegetative development of the plant, showing no significant difference in the germination of seeds, thus rejecting the null hypothesis for bean production and for vegetative development of the plant and the null hypothesis is accepted for germination.

Conclusion: By using three different sowing dates, it was observed how the phenomena caused by climate change can affect the development of the crop, during the research atypical rains occurred during the flowering season, causing the flower to fall, affecting bean production. In addition, in the presence of excessive humidity, the presence of the fungus Sclertotium rolfsii.Sac developed. fungus that produces the drying of the plant causing in some lots a prevalence of 60% up to 70% of the population of the lot, mainly in the first two sowing dates. In this sense, the significant difference produced by the rejection of the null hypothesis is interpreted, both in vegetative development and in bean production, with respect to germination the null hypothesis is accepted because at the time of this process there were no Atypical meteorological phenomena, so it is recommended to continue with the research work modifying sowing dates until the optimal production date is found.

Keywords: Climate change, diseases, vegetative development

Audience Take Away:

- Effects of climate change on the development of beans (Phaseolus vulgaris L.)
- Affecting bean production on different sowing dates in the bean crop (Phaseolus vulgaris L.)
- The prevalence of the fungus Sclertotium rolfsii.Sac.in bean cultivation (Phaseolus vulgaris L.)

Biography:

Phytotechnical Agronomist Engineer. 1985 UAAAN.

Postgraduate in Business Administration. 1998 UAdeC

Doctorate in Strategic Administration. 2013 IIAE

Candidate for a Doctor of Administration and Senior Management. UAdeC

Certificate in Labor Competencies for the delivery of human capital training courses.

CEO of the UAAAN Center for Basic and Applied Research Researcher

Professor of the subjects of Biostatistics and Introduction to Statistics at the Antonio Narro Autonomous Agrarian University

Head of the Department of Basic Sciences at the Antonio Narro Autonomous Agrarian University

Author of the book Biostatistics applied to veterinary medicine and livestock research in 2017.

Author of the book Principles of Biostatistics in 2019.

Co-author in four scientific publications in an indexed journal in 2019.

Advisor in eight investigations for bachelor thesis in 2019.

Speaker at National and International Congresses.

Rocha Quinones Juan Leonardo*; Avila Cisneros Rafael; Gonzalez Avalos Ramiro; Pena Revuelta Blanca Patricia; Rodriguez Dimas Norma

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PDCA application in bean cultivation in Northern Mexico

Antonio Narro Autonomous Agrarian University of the Department of Basic Sciences of the Highway to Santa Fe and Periférico Raúl López Sánchez S / N, Col. Valle Verde, Torreón Coahuila Mexico

Among the five varieties registered in 2010 by the INIFAP network of beans and other grain legumes in Durango is Pinto Bravo, which has been evaluated in different environments to establish its level of tolerance to environmental factors, which reduce productivity and grain quality. Among the factors that reduce bean productivity in the Semi-arid Altiplano, is humidity stress, which is caused by scant and erratic distribution of rain and edaphic conditions, such as sandy, shallow soils, poor in organic matter. and with low moisture retention capacity. (Rosales Serna and Collaborators; 2011).

Climate change is the greatest environmental threat facing humanity, it is the evil of our time and its consequences can be devastating if we do not drastically reduce our dependence on fossil fuels and greenhouse gas emissions. In fact, the impacts of climate change are already perceptible and are evidenced by data such as:

- The global average temperature has already risen 1.1 ° C.
- Damage to crops and food production.
- Extreme meteorological phenomena. (Greenpeace; 2019)

PDCA is a management method that corresponds to the actions necessary to guarantee the solution of a problem. The problem can be good, when it is better than the goal, or bad when it comes to unwanted deviations in a certain pattern. The objective of the PDCA cycle is to guarantee a process of continuous improvement, where the treatment of anomalies is guaranteed, seeking to increase productivity. (Rock Content and collaborators; 2018).

Objective: Apply the PDCA methodology to evaluate the germination efficiency of the various bean plant varieties (Bravo, Centauro and Saltillo), forecasting and eliminating potential risks, with the use of quality tools that allow to identify, measure and try to control the process with the help of statistical analysis using the statistical package MINITAB.

Method: The experiment was developed in the period May-September 2020 in the San Antonio de los Bravos experimental field of the Antonio Narro Autonomous Agrarian University in a geographic location of North Latitude: 250 33´ 21 ", West Longitude: 1030 22´ 36 In the city of Torreón Coahuila Mexico. Three varieties of beans (Phaseolus vulgaris) were used: Pinto Bravo, Pinto Centauro and Pinto Saltillo by means of a random block design with three repetitions each.

Results: The ANOVA method for a single factor was used to compare seed germination, plant height and stem thickness, validating with the Tukey test with a reliability of 95 percent. Obtaining that there is no significant difference in seed germination, plant height and stem thickness, so the null hypothesis is accepted for these variables. In the first stage, the Plan stage, variables such as sowing technique, dates and irrigation technique, quantity and technique of fertilizer use, quantity and technique in the use of insecticides, plant germination, plant size, thickness, and climate, considering pest infection as a

risk for the second stage of Making, the quality tool was used to generate solutions to control the process and thus reduce the possibility of potential risks occurring, in the third stage of Check, favorable results are observed that generate a normalized behavior in the variables that allowed to control the process and for the last stage, Acting based on the results, a germination greater than 70% was observed, as well as an increase of up to 30% in the size of the plant, with respect to production, was affected by atypical weather situations.

Conclusions: When using three different sowing dates, a normal trend was observed in the planting, germination and vegetative development process of the plant. With regard to grain production, the development of the crop was affected by the occurrence of atypical climatic phenomena, however the use of the PDCA methodology allows a better control of variables implicit in the establishment and development of the crop. continue with the research work to replicate the project by modifying sowing dates that will serve as a basis for future agricultural cycles which will allow us to anticipate these atypical situations, managing to control the process, without being affected by the climate of the region.

Keywords : PDCA, temperature, germination

Audience Take Away:

- Present an alternative to increase productivity and reduce variability and / or eliminate failures / defects using as the main variable the impact of climate change on different planting dates using three different bean variables, it can be applicable for any production system agricultural.
- Use the MINITAB statistical software and quality tools that allow us to carry out the four stages: Plan, Do, Control and Act. And thus be able to control agricultural processes and anticipate possible failures from the use of the methodology based on the PDCA methodology.

Biography:

Industrial Engineer with a specialty in Quality and Productivity. 2017 ITL.

Postgraduate in Business Administration Quality and Productivity. 2019

Universidad Tec Milenio Certified in Green Belt SIGMA PRO INC. 2019

Research professor of the subjects of Biostatistics and Introduction to Statistics at the Antonio Narro Autonomous Agrarian University

Co-author of the book Principles of Biostatistics in 2019.

Hua Bai[1]*, Tushar Kanta Das Nakini[2], Guilherme DeSouza[2], and Felix Fritschi[3]

[1]School of Agricultural Sciences, Northwest Missouri State University, Maryville, Missouri, USA
[2]Department of Electrical and Computer Engineering, University of Missouri, Columbia, Missouri, USA
[3]Division of Plant Sciences, University of Missouri, Columbia, Missouri, USA

From gaming to high throughput phenotyping: use of an X-box camera to model soybean 3D structure and morphological traits

Abstract: The world population increase coupled with the depletion of natural resources are a dangerous combination that is threatening humanity and other life around the world. At the current rate, crop production must be doubled by 2050 in order to meet population demand. High throughput phenotyping in agriculture has drawn increasing interest in recent years. This research introduces an unprecedented sensor, Kinect sensor, for 3D assessment of crops on a high-clearance tractor platform. The development of crop canopy 3D models, and calculation of canopy traits such as plant height, number of pods per node, etc can be achieved through light detection and ranging scanners (LIDAR). However, its complexity and high cost makes this technology difficult to implement for research and breeding proposes. The advantage of Kinect sensor besides its price, $200 per unit, is the ability to capture depth images from as many viewing angles as possible. Depth images can then be converted to point clouds, which will be further processed and combined to form a single and complete 3D model of the plant. Those 3D models can help to extract phenotypes of plants such as plant height, canopy area, number of pods per plant, and node, will provide valuable information for agronomists, breeders, geneticists, and physiologist to study their correlation with growth, resistance to biotic and abiotic stresses, and ultimately yield. Except Kinect sensors, some other sensors are also deployed on the platform, including ultrasonic sensors, thermal sensors, and spectrometers to monitor plant height, crop canopy temperature, and canopy reflectance, respectively.

Audience Take Away:

- Kinect is the alternate technology of LIDAR in Agriculture
- 3D structure of plants could be extracted from Kinect images
- Numerous information of plants can be obtained from the 3D imag
- Importance of this high throughput technology

Biography:

Dr. Bai studied Bioengineering at University of Arkansas, USA and graduated as MS in 2012. She then joined the research group of Dr. Larry Purcell at University of Arkansas, USA. She received her PhD degree in 2016 majoring at Agronomy and Crop Science, at the same institution. After three year postdoctoral fellowship supervised by Dr. Felix Fritschi at University of Missouri, USA, she obtained the position of an Assistant Professor at Northwest Missouri State University.

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