magnus Group

4TH EDITION OF EURO GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

SEPT 12-13

VIRTUAL EVENT

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# BOOK OF ABSTRACTS

## 4TH EDITION OF EURO-GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

## 12-13 SEPT

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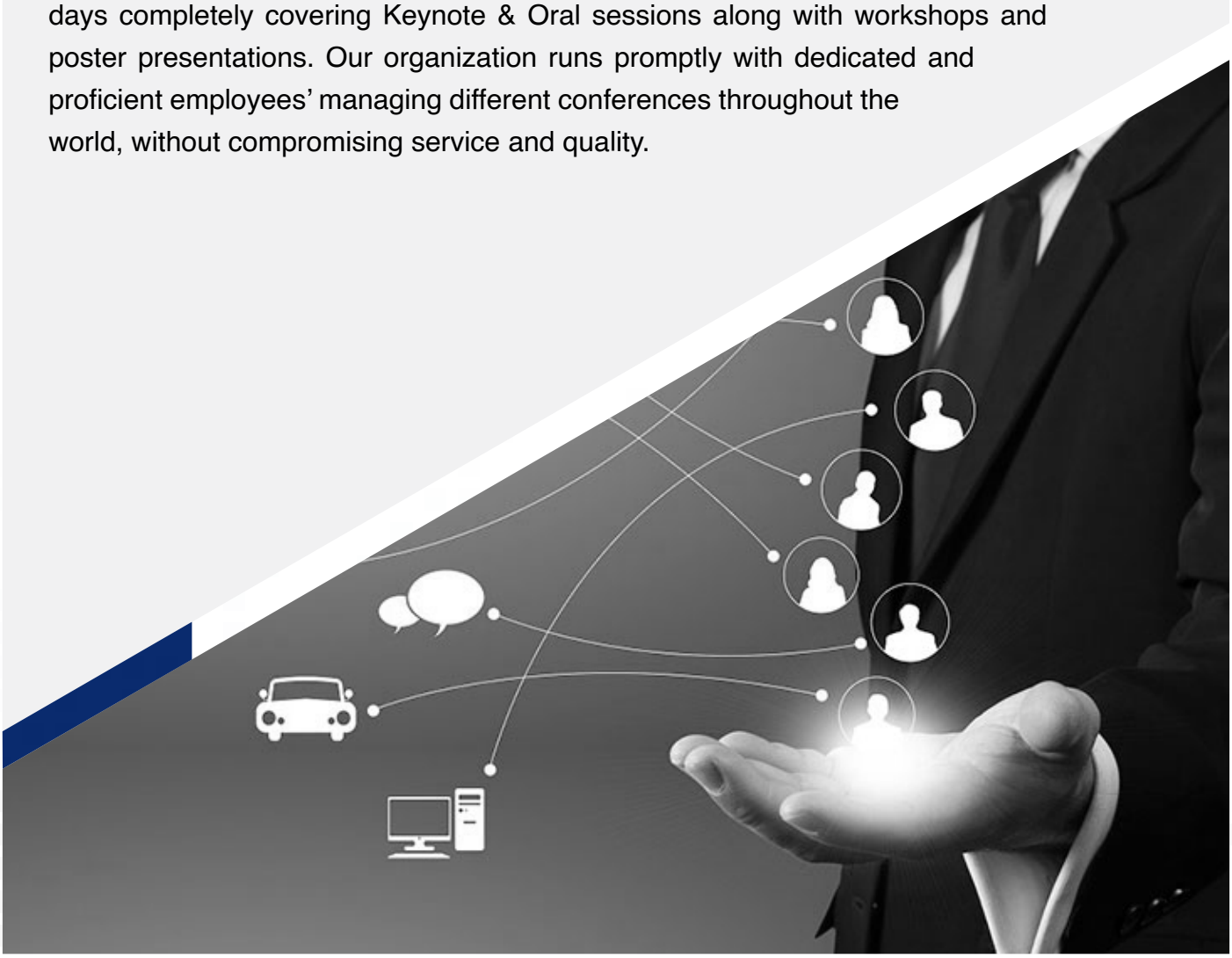
# ABOUT MAGNUS GROUP

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

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



# ABOUT FAT 2022

Magnus Group welcomes you to our Online Event entitled "4th Edition of Euro-Global Conference on Food Science and Technology" FAT 2022 scheduled on September 12-13, 2022 with the theme "Harnessing the Latest Innovations and Laying Foreground for Future of Food Science and Technology"

FAT 2022 is an international platform that amalgamates world renowned experts of both academics and industries within the discipline of Food Science and Technology from all over of the world. This event brings together all the Food scientists and nutritionist to exchange and innovates new theories and practices of Food Science and Technology.

# KEYNOTE FORUM

## DAY 01

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

12-13 SEPT

**Peng Sun*, Meinan Chan, Feifei Wang, Fengtao Ma, Yuhang Jin**

State Key Laboratory of Animal Nutrition, Institute of Animal Science, Chinese Academy of Agricultural Sciences, Beijing, China



## Supplementation with galacto-oligosaccharides in early life persistently facilitates the microbial colonization of the rumen and promotes growth of preweaning Holstein dairy calves

We aimed to determine the effects of dietary supplementation with galacto-oligosaccharides (GOS) on the growth performance, serum parameters, and the rumen microbial colonization and fermentation of pre-weaning dairy calves. The study comprised two phases of 28 days and 42 days, respectively. During phase 1, 24 newborn female Holstein dairy calves were randomly allocated to consume a diet supplemented with 10 g/d GOS (GOS, n = 12) or not (CON, n = 12). Thereafter, during phase 2, the GOS group was further divided into two groups: one that continued to consume GOS (GOSC, n = 6) and one that no longer consumed GOS (GOSS, n = 6), alongside the CON group. Galacto-oligosaccharides increased the average daily gain (ADG), body weight, feed efficiency, and serum high-density lipoprotein-cholesterol concentration of dairy calves during phase 1 ($P < 0.05$). Supplementation with GOS for the entire study reduced the incidence of diarrhea and increased the serum total protein and Ca concentrations ($P < 0.05$) compared with the CON group. The effect of GOS supplementation persisted after it was stopped because the ADG and final body weight of the GOSS group were higher than those of the CON group ($P < 0.05$). Furthermore, the GOSS group showed a persistently lower incidence of diarrhea and greater colonization of the rumen with probiotics, at the expense of less beneficial bacteria, which would promote ruminal fermentation and microbial protein synthesis. These findings provide a theoretical basis for the rational application of prebiotics and have important practical implications for the design of early life dietary interventions in dairy calf rearing.

**Audience Take Away:**

- Supplementation with GOS promoted the growth performance of dairy calves by increasing ADG and body weight. Supplementation with GOS increased the serum concentration of HDL in the short term and that of TP in the long term. It also reduced the incidence of diarrhea, increased serum Ca concentration, and modified rumen microbial colonization and fermentation in calves
- GOS supplementation had persistent effects that increased ADG and body weight at weaning, reduced the incidence of diarrhea, and improved the rumen microbial structure and promoted rumen fermentation by increasing the relative abundances of Bacteroidetes and *Prevotella* and reducing the abundance of deleterious bacteria
- This study might provide important insights into the rational use of GOS and have important practical implications for the design of early life dietary interventions in dairy calf rearing
- Further study is needed to investigate the exact mechanisms by which GOS can increase the relative abundance of *Prevotella* and promote rumen development in preweaning dairy calves

**Biography:**

Dr. Sun studied Animal Nutrition and Feed Science at the Jilin Agricultural University, Changchun and graduated as MS in 2005. She then joined the research group of Prof. Defa Li at the Ministry of Agriculture Feed Industry Center (MAFIC), China Agricultural University. She received her PhD degree in 2008 at the same institution. She worked at the Institute of Animal Science, Chinese Academy of Agricultural Sciences (CAAS), Beijing, China. She obtained the position of a Professor at the CAAS. She has published more than 30 research articles in SCI(E) journals.

**Mark Woolfe[1]* and Selvarani Elahi[2]**

[1]Secretary of the Food Authenticity Network, LGC, Teddington, UK
[2]Deputy Government Chemist, LGC, Teddington, UK

## The challenges in tackling food fraud

Food fraud is as old as the beginnings of trade in food, and today it is regarded as major problem to global food integrity. As there is no legal definition, this can be a hurdle in its prevention and the ability to take legal enforcement action. There many challenges in trying to address food fraud.

The first challenge is to define the scope of food fraud, and there are many definitions in the scientific and non-scientific literature. In the UK, the government programme takes a broad scope of food fraud including intentional adulteration, substitution etc, but also circumventing hygiene requirements. Hence in tackling fraud, the legislation and standards associated need to be identified to assist prosecutions.

The second challenge is to have the tools to investigate fraud. It is possible to investigate purely examining documentation. However, documents can be forged, so, having an independent method to verify the authenticity of foods is always desirable. Unlike other areas of food analysis such as contaminants and microbiology, the number of techniques for authenticity methodology is much wider and collectively, are often referred to as "food forensics". As the results can be used to make legal decisions, it is important that the methods are robust and fit-for-purpose, and if based on databases of authentic samples, that the provenance of these are known. Finally, because of the 2013 horsemeat fraud incident, several initiatives have been established to assist in the investigation of fraud. These include setting up UK Food Crime Units, forming Networks to exchange information on cases of fraud, and the Food Authenticity Network, which is an open access resource for authenticity methods and food fraud mitigation.

**Audience Take Away:**

- The audience will learn about food fraud, and how it can be tackled
- They will learn about the range of methods employed to investigate mislabelling and fraud
- If they are involved in food analysis, they may be able to envisage how the method they are using could be applied to food authenticity

**Biography:**

Dr Mark Woolfe FIFST, FRSC: Trained as a food scientist/technologist and has worked in industry and universities in the UK, West Africa, and South America, before joining MAFF in 1984, and the FSA in 1999/2000. His responsibilities covered labelling and standards for the EU Single Market legislation, as well as UK Regulations on a range of specific foods. He has been active in both British and international standards committees (Codex, UN/ECE). He was responsible for the Government's Food Authenticity Programme for 15 years to develop novel methods and organised national surveys to identify mislabelling/misdescription and fraud. He worked closely with enforcement laboratories and local authorities to transfer new methodology and investigate food fraud. Although retired in 2009, he has continued to be actively involved in food authenticity, chairing the Royal Society of Chemistry Committee on Food and Feed Authenticity supervising research projects. He has been the Secretary of the Food Authenticity Network, an open access resource for authenticity methods and fraud mitigation, since its inception in 2015, and in 2018-21, chaired the UK BSI mirror Committee for CEN TC460 Food Authenticity. He still acts as an external assessor for EU research proposals and projects.


## D Esposito Lourdes

Direccion de Prevencion, Vigilancia y Coordinacion Jurisdiccional, Administracion Nacional de Medicamentos, Alimentos y Tecnologia Medica (ANMAT), Ciudad de Buenos Aires, Argentina




# Food surveillance system and monitoring plan for food safety management in Argentina

Argentina has a National Food Surveillance System that contributes to the prevention and control of new food incidents. As it is a federal country, the control of food safety is based on the coordination between the agencies responsible for applying the Argentine Food Code at municipal, provincial and national levels

In order to strengthen food incident management procedures and improve linkage and coordination at the federal level, a federal network of food surveillance information was developed and implemented.

This network allows linking all food control authorities simultaneously, enabling food incident information to be immediately available and facilitating the planning and coordination of integrated management actions, as well as the updating and monitoring of that information on a federal platform.

One of the most outstanding characteristics of the network is that it constitutes a horizontal operating tool in which all the nodes have the information at the same time. The immediate knowledge of the food incidents reported by the nodes allows the rapid activation of management and early response mechanisms.

Furthermore, the National Administration of Drugs, Food, and Medical Devices (ANMAT), through the National Institute of Food, has official control programs for monitoring food products and its manufacturers. Among the national programs, the surveillance of chemical and biological contaminants stands out through the Federal Surveillance Program, which aims to strengthen both prevention activities, alert and rapid response systems, through the detection of hazards present in the food.

The selection of food products to investigate with the Federal Surveillance Program is based on the following health risk: chemical composition; population for whom it is intended; history of foodborne illness; history of improper use of additives and seasonality of consumption of certain products.

Even though ensuring food safety is a shared responsibility between the public and private sectors, a coordinated work must be carried out between the health authority and the company when a food recall takes place.

**Audience Take Away:**

- Design a monitoring plan for food safety
- Epidemiological management of food incidents
- Food surveillance
- Food fraud

**Biography:**

Lourdes D´Espósito, studied food engineering at the Argentine Catholic University and completed a specialization in food science at the University of Buenos Aires. She began working in the National Administration of Drugs, Food, and Medical Devices (ANMAT) at the National Institute of Food in 2005. Lourdes D´Espósito worked for several years in the National Reference Laboratory and since 2020 is in charge of the Office of Prevention, Surveillance and Jurisdictional Coordination.

**T.B.S. Rajput[1]* and Neelam Patel[2]**

[1]Water Technology Centre, Indian Agricultural Research Institute, New Delhi, India

[2]National Institute for Transforming India, New Delhi, India



## IFSHED - a decision support system for scheduling irrigations and fertigations in drip irrigated crops

Drip irrigation system is the most efficient water application method as it minimizes different water losses in conveyance, evaporation, percolation and runoff. Scheduling of irrigation and fertigation in drip irrigation system depends on several parameters including, drip system capacities, crop and its growth stage, soil type and the climate. A decision support system namely, IFSHED was developed to prepare irrigation and fertigation schedule of drip irrigated crops by closely simulating crop water and nutrients needs on daily basis. The DSS was developed in PHP computer language and all the data has been embedded in MySQL. The DSS is ready for its launch on the internet after completing the formalities of its copyright etc. The DSS will save drip users from the burden of managing all data and computing water requirement and determining irrigation and fertigation schedules.

Crop requirements of water and major nutrients are dynamic and keep changing with the stage of growth of the crop. In the DSS, daily crop water requirements were estimated from the interpolated daily evapotranspiration values from the commonly available monthly evapotranspiration values employing the daily crop coefficient values. Daily crop coefficient values were interpolated from three crop coefficients generally available at initial, development and maturity stages of crop growth. Based on the drip system capacities and its estimated daily water requirements, irrigation schedules were developed using the DSS on daily, alternate day or once a week basis, as per the choice of the user. Different soils contain different levels of nutrients as per their health status. Based on soil health, recommended dose of fertilizers and ratios of fertilizers for application through basal or fertigation schedules for fertigation were prepared using the DSS. In the DSS dynamic relationship of major nutrients uptake by crops was simpulated to estimate daily fertilizer requirements for fertigation. Based on the users choice, fertigation schedules were preapared on daily, alternate day or weekly basis using the DSS. A huge data set of soils, crops, climate and other required parameters has been embedded in the DSS to help the user with appropriate values. The DSS requires very limited data input from the user and prepares the irrigation and fertigation schedules for the entire crop duration using the default values available with it from its databank. The article presents the strategies and methodology involved in the development of the DSS and its use with the help of a real field example.

**Audience Take Away:**

- The presentation will present how a complicated process involving a large number of variables be handled simply by using a user friendly DSS with help available at each stage
- The developed DSS is a work of a team involving experts from different domains including crops, soils, water and environment. It will present a god example of finding simple solutions for a complex problem involving different domain experts
- The developed DSS presents a way out for designers for accurately applying the fertilizers economically as well as better production while taking good care of environment too

**Biography:**

T B S Rajput is an Adjunct Professor at Indian Agricultural Research Institute, New Delhi, India and a Visiting Professor at Asian Institute of Technology, Bangkok, Thailand. He has over forty years of experience of research and post graduate teaching in the field of Agricultural Water Management. He is a former Project Director and a scientist of national repute. He has published ten books and more than 200 research articles. He has received many honours and awards for research including the prestigious Rafi Ahmed Kidwai Award, the highest award an Agricultural Scientist can get in India.

# SPEAKERS

## DAY 01

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

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12-13 SEPT

## Food-Energy-Water nexus: Risks and vulnerability in an era of climate change

**Grigorieva Elena**
Institute for Complex Analysis of Regional Problems Far Eastern Branch Russian Academy of Sciences, Birobidzhan, Russia

The impact of climate change is global. Although climate change has been recognized by many scholars, the influencing factors and consequences of climate change is still unclear. In addition, the growing food imbalance between countries inevitably increases water pressure. Currently, few studies focus on the international water/food resource balance. The intension is to measure the extent to which water resources and food resources are affected by climate change and the relationship between them on regional and international scales. Food, water and energy have always been important research topics. In recent years, in order to propose a comprehensive solution, the international community has tried to use the Food-Energy-Water Nexus (FEW Nexus) for overall thinking. FEW Nexus policy-making must consider regional endowment and global supply chain. At the initial stage, a preliminary assessment of existing methods for performing WEF nexus is carried out; methods that most adequately estimate the state of the system in the research region are selected and used to assessment of the relationship and risk analysis in the system in an era of global climate change.

One of the priorities of the Sendai Framework for Disaster Risk Reduction 2015-2030 is to understand the risk, i.e. to address issues of monitoring and forecasting. It is necessary to assess risk trends using integrated scenarios that take into account not only the hazard forecast, but also changes in socio-economic impact, vulnerability and adaptive potential, in particular, for a including FEW Nexus (Sendai Framework, 2015). As the structural analysis of climate-related risks includes an assessment of five components: risk hazard, vulnerability, exposure, interaction of risks and adaptation to them, we suggest the next scheme for risk estimation for FEW Nexus. First, the forecast of temperature and precipitation is given and the probability of extreme fluctuations in (a) temperature and (b) precipitation is estimated. Second, dangerous hydrometeorological phenomena associated with a lack of moisture, such as (c) droughts, resulting in (d) wild fires on agricultural land cause significant damage to plant ecosystems. On the other hand, excess moisture can cause (e) flooding and (f) landslides that degrade agricultural land and damage soil fertility and crop yields. Assessment of (g) water balance of small and medium-sized rivers clarify the quantity and quality of surface and underground water that feeds agricultural land. This affects the commodity structure of agriculture in the region.

**Audience Take Away:**

- The socio-economic pathways are recently known to have a deep influence on the exposure and vulnerability to hazards. The main scope of this study is to develop a regional climate assessment program, in which a typology of alternative futures is provided, with such information, one can systematic explore the adaptation and mitigation challenges arising from different SSPs and RCPs under varied climate scenarios
- The audience will learn that exposure to risk is a characteristic of situations that can lead to a risk and can be expressed in some quantitative terms: for example, the area prone to hazards, or the number of people at risk. In this case, when analyzing risks in the "Food – Water – Energy" Nexus, quantitative assessments of the identified hazards include estimation of area covered by heat or cold waves, droughts, floods and other dangerous phenomena, as well as the number of people exposed to these phenomena

**Biography:**

Dr. Grigorieva studied Meteorology at the Russian Hydrometeorological University, St-Petersburg, Russia, and graduated as Specialist in 1988. She then joined the Institute for Complex Analysis of Regional Problems, Far Eastern Branch, Russian Academy of Sciences, Birobidzhan, Russia, where she works as a leading researcher, laboratory of regional social-economical systems. She received her PhD (Environmental Science) in 2004 at the Far-Eastern Federal University, Vladivostok. Research interests in biometeorology: Climate and Agriculture, Climate and human health, Urban climate. She is a Vice President (2014–2023) of the International Society of Biometeorology. She has published more than 70 research articles in SCI(E) journals.

## Effect of salts on the umami taste of ham

**Hiroko Seki**
School of Bioscience and Biotechnology, Tokyo University of Technology, Tokyo, Japan

Pork is cut, cured in salt, filled, and smoked to make ham that contains many umami ingredients. The main umami components of ham are glutamic acid (Glu) and inosinic acid (IMP). IMP is produced by the breakdown of ATP in the muscles. Over time, IMP is degraded by inosinic acid degrading enzymes (IMPases). To increase the umami component, it is necessary to promote protease activity and inhibit IMPase activity.

The umami taste of ham increases during salting. Therefore, in this study, we investigated the effects of salts, such as NaCl, $MgCl_2$, KCl, $CaCl_2$, and $MgSO_4$ at pH 4–8 on the protease and IMPase activity to determine the best salting conditions to produce ham with high umami flavor.

We homogenized pork loin meat in its equal amount of water (w/w) and adjusted the buffer solutions to their respective pH. NaCl at a final concentration of 10 % and $MgCl_2$, KCl, $CaCl_2$, and $MgSO_4$ at a final concentration of 1 % were added after dialyzing the homogenate to determine the protease and IMPase activity, respectively. The reactions were performed at 37°C for protease activity and at 30°C for IMPase activity for 24hr and free amino acids and phosphoric acid were quantified.

The results showed relatively high protease activity at pH 5 for all salts and at pH 6 with NaCl and $CaCl_2$, while IMPase activity was inhibited at all pH by NaCl and $CaCl_2$. pH 5 is the isoelectric point of meat protein where they have the lowest water retention property. A brine containing 1 % $CaCl_2$ and 10 % NaCl adjusted to pH 6 is suitable for producing hams with high Glu and IMP content.

**Audience Take Away:**

- Curing ham at the optimum pH and salt concentration will improve its umami taste and shelf-life.

**Biography:**

Dr. Hiroko Seki studied in Tokyo University of Marine science and technology and graduated as MS in 2012. After MS, she continued to study in the same university and she received her PhD degree in 2015. After three years postdoctoral fellowship, she obtained the position of an assistant professor at Tamagawa University. After she has worked for two and half, she obtained the position of a senior assistant professor at Tokyo University of Technology. She has published more than 20 research articles.

# Investment in graduate education in food science and technology: Foreground for food systems development and innovations: Case of ASEAN countries

**Nerlita Masajo Manalili[1]*and Locel Ann C. Tumlos[2]**

[1]Nexus Agribusiness Solutions, Managing Director, Los Banos, Laguna, Philippines

[2]Human Resource Manager, Motorcentral Group, Philippines

Investing in food science and technology education is a crucial step towards sustainable development and innovation in food systems of developing economies. This is the very premise of the Asian - European International Master's Program on Food Science–Agro Food Industry that was jointly initiated in Southeast Asia by Ecole Nationale Supérieure des Industries Agricoles et Alimentaires (ENSIA) (ENSIA) and the Southeast Asian Ministers of Education Organization (SEAMEO ) The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) Philippines in 2002. Graduates from Cambodia, Laos, Myanmar, Philippines, Thailand and Vietnam underwent a 19-month modular course offered in the Philippines, with lecturers coming from Europe (France, the Netherlands and UK) and Asia (Malaysia, Philippines, and Thailand) and with their required Thesis or research work undertaken in another country in Asia or Europe.

Two decades later, a look into home country-contributions of the 16 ASEAN nationals who benefited from this European Union Asia Link funded graduate course were traced and assessed. Specifically, this paper focused on how this graduate education program contributed to the evolution of the food science field in the beneficiaries' respective countries, how it opened up access to private food companies for collaborative studies (or work) and enhanced academe-industry linkage in food science and technology and consequently how it paved the way for food systems development and innovation. Insights gained will provide specific lessons on planning and designing future investments in food science and technology education in developing economies

**Biography:**

Dr. Nerlita Manalili is currently, Managing Director of Nexus Agribusiness Solutions, a consulting firm. Previously Research and Development Manager of Southeast Asian Ministers of Education Organization's Southeast Asian Regional for Graduate Study and Research in Agriculture (SEAMEO SEARCA) and Coordinator for Asia of Asian-European International Master's Program on Food Science–Agro Food Industry; jointly implemented by Ecole Nationale Supérieure des Industries Agricoles et Alimentaires (ENSIA) (ENSIA) and SEAMEO SEARCA. Formerly regional adviser for Asia on market access of Vredeseilanden (now Rikolto) of Belgium and an agribusiness faculty of the College of Economics and Management, University of the Philippines, Los Banos.

# SPECIAL TALK

## DAY 01

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

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## Grain processing in general and rice technology in specific

**Vasudeva Singh**
Gauhati University, India

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

**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.

## Bio-nanofertilizers: A future for higher food production

**Jagadis Chandra Tarafdar**
Former UGC Emeritus Professor & ICAR Emeritus Scientist, Jodhpur 342008, Rajasthan, India

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

**Audience Take Away:**

- Microbial synthesized nanoparticles may prevent environmental ( air, water, soil) pollution
- It has the potential to reduce or omit chemical fertilizer application as well as plant stress condition
- Microbial synthesized nanoparticles are very safe with recommended doses of application
- It can increase the nutrient use efficiency and profit with much lower investment
- It can protect and increase the efficiency of biofertilizer

**Biography:**

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

# SPEAKERS

## DAY 01

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# Designing colloidal microstructures from plant biopolymers for rheology control and fat mimetics

**Isabel Fernandez**
R&D Platform Lead: Futures & New Verticals, Heura Foods, Barcelona, Spain

We report on novel structured food colloids for emerging applications in designing healthy foods of the future. Water-in-water emulsions comprising colloidal suspensions of microgel particles have been recently created from plant polysaccharides via physical and enzymatic-induced crosslinks. Gelation kinetics was investigated via small-amplitude shear oscillation, and the elastohydrodynamic lubrication mechanism in oral-mimicking processing conditions described using tribilogical models. A reduced friction coefficient was measured due to entrainment of deformable microgel particles to the tribopair contact zone, similar to oil droplets in oil-in-water emulsions. A range of microgel particle structures and crosslinking densities were designed by controlling gelation kinetics and shear-induced break up during production, allowing the microstructure to be tuned to impart desired rheologies and thus textural properties.

Two distinct oil structuring approaches were also investigated using water-insoluble biopolymer fractions from pulse hulls: (i) increasing particle volume fraction ($\varphi$) and (ii) addition of water to previously formed particle-in-oil dispersion at a constant $\varphi$. The particulate oil-continuous dispersions exhibited a viscosity increase as a function of $\varphi$, which was modelled using the Krieger-Dougherty equation. At values close to their maximum volume packing ($\varphi \simeq 0.50$), the dispersions displayed a solid-like behaviour; and an elastic material response was obtained by inducing capillary water bridges between the water-swelled particles, giving rise to a reversibly aggregated network. In this talk, we will discuss novel structuring design principles for controlling bulk rheology and thin film lubrication using plant biopolymers. This comprehensive understanding opens new strategies for: (i) design of water-based colloidal particles with tunable (fat-like) textural attributes and (ii) control the assembly of insoluble plant fractions for structuring liquid oils, thereby creating fat mimetics without chemical gelators.

**Audience Take Away:**

- Learnings can be used to formulate fat-reduced and fibre-rich products with scalable technologies
- Advancing their understanding on food biopolymers micro gels, and structuring oil systems with dietary fibres, from scientific fundamentals to technological approaches
- It provides both theoretical and practical solutions to the clean label issue in plant based foods as well as producing fat-reduced products with superior textural attributes
- List all other benefits:
    1. Clean label foods
    2. Fibre-rich foods
    3. Plant-based formulation
    4. Fat-reduced food design
    5. Texture and mouth feel enhancement

**Biography:**

With a major in Chemistry, Ms. Fernández started her career as NPD Manager in Danone, where she led the development of new products and factory lines in Africa & the Middle East. In 2011, she took a break from Industry to start an Engineering Doctorate in food physics at the U. of Birmingham. She created new biopolymer microgels with designed structures and rheology; and modelled their elastohydrodynamic lubrication in relation to their fat-like textures. Isabel joined Nestlé in 2015 as a Research Scientist in Switzerland, where she focused on developing new PB Technologies from scientific innovations. She holds multiple patents in the PB area and is the author of several publications in high-impact scientific journals. Isabel has recently joined HeuraFoods.

## Soil nutrients, food and human health

**Surendra Singh**
Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (UP), India

Soils are vital to human health because they support both quantity and quality of food and feed production that is essential for human consumption. Intensification of agriculture through advances in agricultural technology and increasing food demand for an ever growing population have put our soils underpressure, leading to nutrient depletion. This has also led to multi nutrients deficiencies (K, S, Fe and Zn) in soils worldwide which in turn have adverse effects on human health. Among the many roles of soils, nutrient storage and supply is one of the most important ones, which in turn support the production of food.There is a close relationship among soil available nutrients, quality food production and human health.

The idea that soils are important to human health is widely accepted in the modern scientific community. Soils are recognized for their contribution in areas such as the supply of adequate quantities nutritious food products, medications and for their assistance in developing the human immune system. Negative health impacts occur when foods are grown in soils that have nutrients deficiencies. There are a number of positive ways that soils enhance human health, from nutritious food production and nutrient supply to medications and enhancement of the immune system. If the soil is supply adequate amount of nutrients for food, the human health also benefits. Hence, the best deficient nutrients (K, S, Fe and Zn) management practices in soil will play an essential role in ensuring food security and healthy immune system of human in years to come. The future belongs to a nation who had nutritional food quality.

**Audience Take Away:**

- Potassium deficiency in soil results low dietary food intake of potassium by human, causing hypertension inhuman
- Sulphur deficiency soils may result in food insecurity with resultant Protein Energy Malnutrition(PEM)
- Iron deficiency in soil results in anemia and immune system of human
- Zinc deficiency in soil impairs wound healing and immune system of human

**Biography:**

Prof. Surendra Singh, Formerly Head, now professor, Department of Soil Science and Agricultural Chemistry obtained.M.Sc. (Ag) and Ph.D. Degrees in Soil Science and Agricultural Chemistry, Banaras HinduUniversity.. Altogether, he has experience more than 33 years (teaching, research, extension, consultancy, development, administration, etc.). Singh has more than 250 publications of national and International repute to his credit. He has guided/advised many M.Sc. and Ph.D. students in Soil Science and Agricultural Chemistry. Dr. Singh has successfully executed more than 17 externally funded research, extension and developmental projects as Principal investigator. He received prestigious several awards of national and International.

## Food wastage and disorganized management – A new age concern

**Ravi Teja Mandapaka[1]* and Rekha Kokkanti[2]**

[1]Centre for Gender Studies, Nutritional Security and UrbanAgriculture, National Institute of Agricultural Extension Management (MANAGE), Hyderabad, Telangana, India

[2]Department of Biotechnology, Sri Padmavati Mahila Visvavidyalayam,Tirupati, Andhra Pradesh, India

Food safety is nothing but utilizing various resources in order to ensure that all types of foods are properly started, prepared and preserved. Hence, they are safe for consumption. Internal auditing should be conducted on a repeated to make external auditing a smooth-running process. The priority should lie in maximizing food sales, and giving away or selling foods past their prime involved risks that may undermine sales. Times have moved on towards reaching perfection with technology being updated almost every passing hour in the twenty-four. Food wastage, in more than a certain method is gripping problem in the rising scientific scenario. In fact, the Food and Agriculture Organization (FAO) admits, wastage of food has become a perilous question and an issue in our society affecting both poor and rich nations. Food wasting also means wasting "the time and energy" of producing and procuring food, our natural resources and the available land for agriculture. It has a very big and deep and everlasting impact on the economics of a nation affecting the overall greenhouse gas emission. Our focus in this review paperis to create social awareness by reducing food wastage and recycling wasted food wasted through embedded systems.

**Audience Take Away:**

- Importance of food waste control and disposal practices
- Global waste management practices handling food waste
- The need for Physical quantifying of waste, leading to pragmatic, health and safety hazards
- The dearth of segregation and measurements of food waste

**Biography:**

Ravi Teja Mandapaka is a 'Lean Six Sigma' professional based out of Hyderabad, India. He holds a Master of Science degree in Foods & Nutritional Sciences, and proved himself as a competitive researcher and has presented his works in various national and international conferences. In over eight years of professional life, Ravi has written exclusively on science and sports in media, corporate and academia.

# Modifications induced by different additives on nutritional quality and health indices inpoultry meat

**Hebe Fernandez**

Departamento de Agronomia, Universidad Nacional Del Sur, Bahia Blanca, Buenos Aires, Argentina

In poultry production, the composition of the diet directly influences the meat quality of birds. The ultimate goal is to obtain a functional food with direct benefits for the consumer. In this sense, it is highlighted the use of different sources that provide high levels of omega n-3 polyunsaturated fatty acids (n-3 PUFA), in order to modify the lipid profile of the meat. However, rising the degree of unsaturation strongly increases susceptibility to lipid peroxidation. In broiler meat, lipid oxidation is one of the primary causes of limiting its quality and leads to a decrease in nutritional values of meat. The addition of an antioxidant is proposed as a novel technology regarding this problem. The aim of this research deals with the effect of the addition in the diet of two by-products, chia meal (Salvia hispánica L.; DESUS S.A, Argentine) and/or an olive antioxidant (hydroxytyrosol; GENOSA I+D, Spain), on lipid and protein content, fatty acids profile, lipids indices, ratios and enzymes activity and lipid oxidation in the breast. The results obtained in this work suggest that the source of dietary fatty acids clinch the fatty acid profile in meat. The supply of a broiler diet containing chia meal improves lipids indices and ratios and enriches breast meat with n-3 PUFA, with a slight increase in the generation of free radicals. However, the dietary addition of hydroxytyrosol combined with chia meal seems to be an effective way to increase the stability of n-3 PUFAthrough oxidative damage and α-linolenic level, providing improvements in the meat nutritional quality, with consequent health benefits for its consumers. Hydroxytyrosol is also a good alternative to other antioxidants.

**Audience Take Away:**

- The information imparted in this presentation will allow understanding that it is feasible to modify the nutritional quality of broiler meat and achieve a functional food through the addition of low-cost agro industrial by-products to the diet, with benefits for the consumer. Increased intake of n-3 PUFA through the human diet would contribute to the prevention of the occurrence of coronary heart disease, depression, cancer and other pathologies. On the other hand, the consumption of foods rich in fat, especially saturated fatty acids will have the opposite effect. These notions will allow the audience to improve their criteria in food selection to keep healthier
- The research presented in this work will lay the groundwork for future research allowing the use of new additives or deepening into the compounds presented. Currently, there is a growing interest in investigating possible alternatives in the diet of broilers in the early stages of breeding that result in obtaining products of higher nutritional value and hygienically safe quality for public health
- The effects of a dietary by-product of olive industry, hydroxytyrosol, on meat fatty acid profile in broiler diets appear as being limited. In our current study, diets containing 7 mg/kg BW/day of hydroxytyrosol wasnovel. Further research is needed to determine the possible effect of higher doses of this antioxidant on the susceptibility of n-3 PUFA to lipid peroxidation and fatty acid profile.
- Actually, all concepts imparted in this talk are used in several signatures dictated at the Department of Agronomy with the objective to promote student interest
- It provides new information for professionals, since the use of low-cost agroindustrial by-products isexpected to improve animal performance and reduce costs by replacing part of cereals. Moreover, theenrichment of chicken meat with omega n-3 polyunsaturated fatty acids allows obtaining a functional foodwith greater added value and benefits for the consumers health
- This presentation transfers promissory experiences on the importance of the use of these by-products encouraging the development of new trials, as well as, their diet incorporation to provide greater health benefits

**Biography:**

Dr. Hebe T. Fernández graduated as Veterinary at the National University of La Plata, Argentina. She then joined as a professional teaching research assistant at the Department of Agronomy of the National University of the South (UNS), Bahía Blanca. She received the M.Sc postgraduate degree in 2001 at the same institution, later obtained the position of an Associate Professor. Since 2013 she is the Director of the Poultry Broiler Experimental Unit (UEA) of the Department of Agronomy directing grade and posgrade students. The main line of research focuses on the production of sustainable broiler, investigating alternatives in the management of the diet that lead to direct benefits on performance and animal health, as well as meat with higher nutritional value and hygienically safe for public health. Regarding her personallife, she is married and have three sons, loves caring for stray animals and enjoys playing the piano.

## Semi-autonomous vineyard

**Yoav Banitt**
Project Farmer JoeBot, Robotic Perception, Israel

Farming is often not profitable. This absurd reality can sometimes results even with abandonment of agricultural land. One promising solution to this problem is the use of autonomous robotics to reduce operational costs. Reducing involvement of operators can reduce labor costs, reduce risk of injuries for farmers and reduce the cost of expensive machinery.

Autonomous robotics corresponds with using electric vehicles, and then fossil fuels and carbon emissions can also be reduced, supporting efforts to reduce global warming.

Additionally, the use of advanced robotics is an opportunity to introduce a variety of sensors, produce rich large-scale digital data and stress/crop analysis for more effective crop monitoring and crop management using applications with on-line access. Such improved crop management will further increase yields and farmers' profit/gross margins.

Furthermore, such rich digital data lead the way to spot-spray practices, reducing use of agrochemicals and improving food safety, food quality and health for everyone. It's designed to verify the assumption that an autonomous electric vehicle can significantly improve the gross margins and profit margins of farmers, produce rich digital data of the crops for improved crop management and reduce the operational risk for farmers that is involved in practicing agriculture and using chemicals. By doing that, it will improve food safety, food quality and health for the befit of everyone.

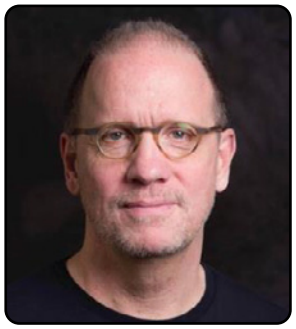
Robotic Perception has developed an autonomous electric vehicle that provides precision spraying and mowing, under the agROBOfood project, with Horizon 2020 funding. Our project is called Farmer JoeBot. 15 sensors and cameras are mounted on the vehicle, along with AI detection capabilities in real-time for both crop monitoring and for the autonomous operations of the vehicle.

The collected data is sent to the cloud and displayed on a webapp for crop management purposes. The app shows single-tree resolution heatmaps of the fields with crop yields, irrigation requirements, virus stress detection data and has sharing options for consultation with agronomists.

The vehicle is designed to provide spraying and mowing services, that typically account for >50% of the annual vineyard treatments. A robotic sprayer was developed with capability to reduce the use of chemical pesticides, that sprayer is now in patent pending status.

The combination of the autonomous capabilities of the vehicle that account of >50% of vineyard operations, together with the webapp that allows single-tree analysis of crop yields and irrigation requirements, and together with the capability of remote control of a fleet of such vehicles from a tablet, in fact allow to manage vineyards semi-autonomously.

**Biography:**
Dr. Yoav Banitt received his PhD in computational neuroscience from the Hebrew University, Jerusalem in 2010. His research involved detailed neural network models of the visual cortex in mammals, as well as in the neocritical column model of the Blue Brain project, under the supervision of Prof. Idan Segev in the same institution, and Prof. Kevan Martin from ETH, Zurich. After completing his PhD, he was co-founder and CTO in two startups, until in 2019 he founded Robotic Perception, where he is now CEO. Robotic Perception was awarded Horizon 2020 funding for developing an autonomous electric vehicle for vineyards.



# Deep learning and grapes: The digitalization of plants, one plant at a time

**Mark DeSantis[1]* and George Kantor[2]**

[1]College of Engineering, Carnegie Mellon University & CEO,Bloomfield Robotics

[2]Carnegie Mellon Robotics Institute & Chief Scientist, BloomfieldRobotics, Pittsburgh, Pennsylvania, USA

Since the dawn of agriculture, crop monitoring and inspection remains a mainstay of every farmer's routine. Today,many farmers visually inspect their crops armed with a variety of tools to help ensure ideal plant health and performance. Although human visual inspection remains an essential part of agriculture, it has many challenges andmany limitations. Research over the last decade or so has assessed the applicability of computer vision and deep learning to address the crop inspection challenge. These approaches have shown tremendous promise, they are onlyjust now beginning to go beyond the research phase into commercialization. Around 2015, image processing methods using deep neural networks began to replace the earlier classicalcomputer vision approach, providing both better performance and more generalizable results. Again, through the early work of the CMU team, a StalkNet architecture was developed, which combines an RCNN feature detector with a GAN based pixel segmentation.

To date, StalkNet has been trained to measure dozens of widely varying features in different crops, ranging from leafnecrosis to fruit ripeness to sorghum seed size for grain yield. Bloomfield currently services 16 wine, table and juice grape vineyards in three countries (i.e., US, France & Italy) as well as a blueberry grow in Peru.. Flash combines high-resolution flash lighted stereo RGB images with a cloud-based deep learning pipeline to inspect and assess the health and performance of each and every plant in a field or grow one plant at a time. The result, so far, with Bloomfield's vineyard customers is yield estimation, pest/disease detection, labor saving and digitalization. This comprehensive analysis forms the foundation for Bloomfield's health and performance assessment of each geo- located plant, one plant at a time through a web-based dashboard accessible via tablet, cellphone or computer.

Bloomfield's approach to inspecting and assessing plants contrasts sharply with the visual inspection which includes sparse subjective judgements of randomly sampled plant

**Audience Take Away:**

- The audience will learn how the digitalization of individual plants is transforming agriculture upstream anddownstream
- The audience will understand how digitalized crops will impact everything from higher quality and larger yields to chain of custody and product differentiation at the store. This system and the consequent data (e.g., digitalized 12 varieties of fourteen billion grapes over two years so far) can provide researchers and designers: (1) a massive data set of baselines for a dozen plant features over two years, (2) connect plant levelcrop management and treatments to food quality and outcomes

**Biography:**

Mark is the CEO of Bloomfield, a venture-backed AI company in agriculture. He was previously cofounder and CEO of RoadBotics, a venture-backed AI company assessing roadway infrastructure. He was also previously cofounder and Chairman of kWantix, a quant energy hedge fund, and cofounder and CEO of kWantera, a venture-backed energy trading company. Previously, he was CEO of Think Through Learning, a venture-backed online tutoring company and US Managing Director of ANGLE Technology, PLC, a UK-based venture capital firm. Mark is an Adviser to MIR Ventures in Palo Alto and Cascadia Capital in Seattle. He also has dual appointment as an Adjunct Professor at the College of Engineering and Heinz College at Carnegie Mellon University. Mark holds a PhD in Public Policy from the Schar School of Policy and Government at George Mason University and is completing a Doctorate in Business Administration at the Fox School of Business at Temple University.

## Opportunities for partnering with African food industries

**Habiba Hassan-Wassef**
National Nutrition Sciences Committee, Academy of Scientific Research and Technology, Cairo - Egypt

The presentation builds on the premise that Africa will not be able to realize the policy decision to rely more on its own locally produced nutrient rich food resources in the fight against poverty and food insecurity, without an active contribution of the food processing industry. The latter is regarded as instrumental in making it possible for the modern consumer to access local foods and traditional food products in a form that is adapted to the mobility, lifestyle, and preferences of the 20th century consumer. In this context, food industry support is actively sought at a time when the food industry in western countries is responding favorably to initiatives for benchmarking progress made towards healthy and sustainable diets. The presentation reviews the status of the African situation as reflected in the recent UNFSS National and Regional Dialogues, identifying the gaps, weaknesses, and opportunities for the food industry to strengthen African food systems, food value chains, and urban food supply systems. Benefiting from the wealth of recent studies and scientific evidence produced by national and international academia, specialized entities and organizations, the food industry will be able to enjoy the clearly defined supportive policy and strategy framework for food and nutrition security set by the African Union. Furthermore, the African free trade agreement (AfCFTA) and the "Made-in-Africa" initiative (work in progress), as well as the serious mobilization of the Codex CCAFRICA and the ARSO (African Regional Standards Organization) for completing the standards and specification for African food products and for ensuring compliance with international standards, are all efforts that aim to ensure safety and facilitate trade in African commodities and food products. The food industry is called upon to partner with Africa and help advance its food industry; reduce dependence on imported foods and integrate locally produced foods into food value chains and urban food supply systems; and more importantly, strengthen the capacity of the African food industry to join in the continent-wide mobilization for providing innovative solutions to manage the social and economic impact of the Covid 19 pandemic, that is being compounded by the fallout from the Ukraine war.

**Audience Take Away:**

- Advocate for a win-win partnership role for the food industry in support of the realization of health, nutrition and the environmental commitments and goals
- Draw attention to the wealth of very pertinent African and EU-AU collaborative research and innovation outcomes in support of food and nutrition security initiated for realization of the 2014 Malabo Declaration commitments of African Heads of State
- Raise awareness of the potential benefits for the food industry to be gained from the current accelerated initiatives to: facilitate application of the African free trade agreement (AfCFTA); the compliance of African standards and safety criteria with international norms (continued efforts of ARSO and CCAFRICA); the policy and strategy decisions of the African Union to – *inter alia* - reduce the food imports budgets, to promote consumption of locally produced foods and commodities, to integrate traditional foods in food value chains and urban food supply systems to reach the urban food retail markets. It is the food industry that is the "vehicle" that can make it possible for the modern African urban consumer to eat "African"
- The food industry can benefit from the recent programme (work in progress) for promoting continent-wide "Made-in-Africa" products. It is opportune for the food industry, in particular the multi-nationals, to consider working in partnership with national business community to satisfy a projected growing market demand for processed indigenous/ locally produced (see above-mentioned AU policy) to satisfy the lifestyle and preferences of the modern urban consumer (an estimated 70% of Africans will be living in mega-cities by 2050)

- The food industry contribution to the above continent-wide mobilization for realization of Africa's food and nutrition security is now called upon to consider innovative and environment friendly approaches in support of strategies deployed to control and manage the fallout of the Ukraine war on food and fuel prices, which have compounded the economic and social impact of Covid 19 pandemic

**Biography:**

An initial career in nutrition research took Dr. Hassan-Wassef to Paris University, then Columbia University where she was a Whitehall Research Fellow. Lifelong service with WHO ended with high level strategy and policy responsibilities in Geneva. Dr. Hassan-Wassef's knowledge and expertise in nutrition, food and health was further enriched through continued national and regional research projects and expert services to multilateral, bilateral, and regional organizations in the Middle-East, Africa and Europe. A Trustee of the African Nutrition Society and Vice-President of the African Society of Mycotoxicology, she is author of several scientific publications and laureate of many awards and prizes.

# KEYNOTE FORUM

## DAY 02

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

12-13 SEPT

## David Gally

Chief Scientific Advisor for Food Standards Scotland, Pilgrim House, Old Ford Rd, Aberdeen, UK, AB11 5RL and Chair of Microbial Genetics at the Roslin Institute, University of Edinburgh, Easter Bush Campus, Edinburgh, UK, EH25 9RG.

# Source attribution of foodborne bacterial pathogens using machine learning approaches

Foodborne pathogens continue to be a major threat to human health and threaten the viability of particular foods and major outbreaks have profound economic and social consequences. At Food Standards Scotland (FSS), we work with academic, commercial and public health partners to keep food safe and this includes instigating and supporting genomic studies on bacterial isolates associated with human infections from food or drink such as *Salmonella*, *E. coli* and *Listeria*. A key target is accurate source attribution i.e. prediction of animal and/or geographical origins of such pathogens based on their whole genome sequence and there have been a number of groups applying machine-learning (ML) methods to improve what we can predict about both the source and infection threat of an isolate based on its genome sequence. As with all ML approaches, there is the need to have as much high-quality input training data as possible on which to build the models. At FSS we have had a historical focus on source attribution for *Campylobacter* and Shiga toxigenic *E. coli* and are currently involved in projects focused on *Salmonella* Typhimurium and *Escherichia coli* isolated from human, cattle, pigs and poultry with three main aims: (1) to predict the likely animal source of any human or food isolate; (2) to predict the infection threat to humans of an isolate from an animal or food source; (3) to identify the genetic elements more likely to be associated with particular hosts. The presentation will introduce the main research in this area and our main findings about the accuracy of the methods and how it can be applied to enhance food safety and public health.

**Audience Take Away:**

- I will introduce the use of bacterial genome sequences to understand relationships between isolates and to understand transmission routes
- I will explain how machine learning can be applied to predict the source and threat of a bacterial isolate based on its genome sequence
- I will show data looking at the challenges and advantages of these methods and how they can be applied to help track the origin of outbreaks
- I will discuss how such models could be applied to improve the safety of certain foods and help decide on appropriate interventions in the food chain

**Biography:**

I am the Chief Scientific Advisor for Food Standards Scotland and hold a personal chair in Microbial Genetics (since 2006) at the Roslin Institute, University of Edinburgh where I lead an Institute Strategic Programme on the 'Control of Infectious Diseases in Livestock'. My training is as a Microbiologist with a degree and PhD from Newcastle University, followed by research positions in Michigan & North Carolina. After a Medical Research Council Fellowship (1994-98), I obtained a Lectureship in Bacteriology at Edinburgh Vet School and then a Veterinary Fellowship to study the biology of enterohaemorrhagic *E. coli* (EHEC) O157 in cattle working in partnership with scientists in the UK and around the world. My main current research interests are around predictive genomics, phage therapy and bacterial gene regulation.

**Raquel B. Gomez-Coca*, Maria del Carmen Perez Camino, Wenceslao Moreda**

Department of Characterization and Quality of Lipids, Instituto de la Grasa -CSIC-, E-41013-Sevilla, Spain



## Mineral Oil Hydrocarbons (MOH) in virgin olive oil and olive pomace oil

Mineral Oil Hydrocarbons (MOH) are complex mixtures derived from crude oil. From the analytical point of view, MOH can be separated in Mineral Oil Saturated Hydrocarbons (MOSH), and Mineral Oil Aromatic Hydrocarbons (MOAH). MOSH consist of linear and branched alkanes and alkyl-substituted cyclo-alkanes, whereas MOAH comprise alkyl-substituted polyaromatic hydrocarbons. MOH occur in food both as a result of contamination and from various intentional uses in food production having as a consequence consumer's exposure to a range of compounds whose effect in human health is only indirectly documented and which lacks robust risk assessment. MOH are present at specific concentrations in all kind of food, including vegetable oils. The aim of this research was contributing to the monitoring for the food groups making a relevant contribution to the background exposure of MOSH and MOAH. Among those food groups vegetable oil is included in the list that EFSA, in its recommendation, published as 'classes of food to be included in future monitoring' (EFSA Journal 2012, 10, 2704).

In this work, using the state-of-the-art on-line HPLC-GC-FID method similar, although updated, to that described by Biedermann (J. Chromatog. A 2012, 1255, 56), we have gathered information on the presence of MOH in a wide number of: extra virgin (104 samples), virgin (14 samples) and lampante (44 samples) olive oils, and olive pomace oil (50 samples), all of them directly provided by the corresponding producers, a fat matrix of the upmost importance for the Mediterranean Diet. We have determined not only their MOSH and MOAH concentrations but also through GCxGC-TOF/MS we have identified the main groups of compound present in both fractions.

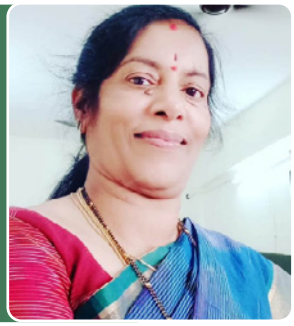
As it was expected, our measurements gave chromatographic signals on the C10-C50 range, which is actually the range interesting from the physiological point of view, since hydrocarbons below C10 are not relevant for food contamination due to their high volatility, and those above C50 are scarcely absorbed after digestion. Actually, the C-atom number of MOSH to which humans are exposed via food goes from C12 to C40, centring at C18-C34. Our results confirm this tendency and show a wide range of analyte concentration depending of the origin, extraction process, and quality of the raw material.
We concluded that in all samples both MOSH and MOAH concentrate in the C25-C35 range followed by the C36-C40 range. Besides, the identification of some MOAH subclasses demonstrated that in olive pomace oils only 2-ring MOAH are present, being free of the mutagenic 3-7 aromatic ring species.

**Audience Take Away:**

- They will learn what MOH are
- They will get to know the sources of MOH responsible for the background presence of these compounds in food
- They will know at which concentration MOH are expected to be in olive oils and in olive pomace oils, together with a very important piece of information regarding the structure of those MOAH from olive pomace oil: their 2-aromatic-ring structure and therefore their virtually lack of mutagenicity

**Biography:**

Dr. Gómez-Coca studied Pharmacy at the University of Sevilla, Spain. She then got her European Doctor Degree by doing the experimental part of her PhD work at the University of Basel, Switzerland. After one year postdoctoral stay in the same institution she got a three years postdoctoral fellowship at the Spanish National Research Council, where she is still working. One of her main lines of work is the development of methods of analysis for olive oil fraud detection. She is also focused on the analysis of contaminants (3MCPD-glycidol, MOAH-MOAH) in edible oils and fats. Additionally, she lectures master's degree students at Universidad Pablo Olavide, in Sevilla and participates on a periodic bases on a number of dissemination sessions.




## Suriyavathana Muthukrishnan

Plant Therapeutics Laboratory, Department of Biochemistry, Periyar University, Salem-11, India


# BI metalic oxide (Cu&Zn) green synthesis and phytochemical characterization in Curcuma Aromatica

Medicinal plants or their extracts have been used by humans since time immemorial for different ailments and have provided valuable drugs. In recent years, nanotechnology research is emerging as cutting edge technology interdisciplinary with physics, chemistry, biology, material science and medicine. Since few decades ago, the advances in nanoparticles technology have played a remarkable role in medical, pharmaceutical and textile industries. Metal nanoparticles like silver, zinc and gold have been used as therapeutic agents in medical institutes for some years. Curcumin is an active component of turmeric plant; it is responsible for its characteristic yellow color and therapeutic potential. Curcumin is of considerable interest because of its antioxidant, anti-inflammatory, antimicrobial and anticancer activities. Biosynthesis of clean, biocompatible, nontoxic and environmental-friendly nanoparticles produced both extracellularly and intracellularly deserves merit. *Curcuma aromaticaSalisb (C. aromatica)* is known wild turmeric in English, "janglihaldi" in Hindi, and "Yu Jin" in Chinese in tamil "kasturiManjal" and "kaatuManjal". It is mentioned as 'Vanaharidra' in Ayurveda. The medicinal properties of this plant are being used in many traditional systems of medicines like Ayurveda and Unani. It is also one of the ingredients of many herbal medicines used in China and other South East Asian countries. It is commonly used as a coloring and flavoring agent, as well as in many traditional medicines in Southeast Asian countries. The rhizomes of C. aromatic are used in traditional medicine for eliminating blood stasis, delaying the ageing process, pain relief, and protecting against liver diseases, the rhizomes of C. aromatic are used internally as a tonic and carminative, while being topically applied for various skin ailments, sprains, bruises, as an antidote for snake venom, and also to enhance complexion. The Phytochemical screening of Curcuma aromatic methanolic extract showed the various phytochemicals like, Flavonoids, phenols, tannins. The quantitative analysis exhibited high amount of Flavonoids. The reduction of Copper ions was monitored by UV-Vis Spectrophotometer for the metal ions stability. The characterization of (CuNps) by UV-Spectrophotometer from the range 200-1100 and absorption peak between 200- 400 nm the presence of ZnNps. The FTIR spectral analysis provided a valid note on chemical nature on the phytoconstituent of Curcuma aromatic (wide range functional groups). The structural elucidation of Curcuma aromatic confirmed with GC-MS analysis of (R)-1-Methyl-4-(6-methylhept-5-en-2-yl) cyclohexa-1,4-diene, 1, 3-Cyclohexadine, 5-(dimethyl-4-hexenyl)-2-methyl-, [S-(R*,S*)]. Curcuma aromatic possess enriched source of phytocompounds which is noted to be of therapeutic value.

**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 F. Stukach[1]* and Yelena Shevchenko[2]**

[1]Omsk State Agrarian University, Omsk, Russia
[2]Center of Innovation and Technology Development QazInnovations

# The industrial concept of the formation of the megacity's food aid infrastructure in the conditions of overcoming the consequences of the pandemic

Research paper considers the effectiveness of establishing an integrated structure of the restaurant and catering industry in megacities to overcome the consequences of the pandemic. Centralized food supply to kindergartens, schools, hospitals, social institutions, etc. helps to overcome the consequences of the pandemic more efficiently. Centralization and scaling food production (18-20% of the total consumption in the region) allows implementation of innovative technologies, more efficient resource consumption, ensuring food security, sanitary and technological control as well as efficient use of production capacity. The purpose of the paper is to design the concept of developing regional infrastructural institutions for providing domestic food aid to overcome the consequences of COVID-19 pandemic. Establishment of a production and technological center as part of proposed infrastructural institutions implemented on the basis of public-private partnership will allow synchronizing efforts and resources at all stages of food production for socially vulnerable groups of population.

**Audience Take Away:**

- The infrastructure of domestic food aid to socially vulnerable categories of the population in overcoming the consequences of the COVID-19 pandemic in the Russian region:
- Design developments, industrial concept, market mechanisms.
- Efficiency by levels: region, farmers, needy categories of the population.
- Use it to deepen their research and teaching.
- To contribute to the practical solution of the problems of their regions, to consider as a solution option, will give new information taking into account the specifics of the countries

**Biography:**

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. 7. Scientific interests. Regional economy, formation and development of infrastructure. Formal and informal institutions: agro-economic aspect. The cultural code of the population, social capital, etc.

# SPECIAL TALK

## DAY 02

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

12-13 SEPT

## Sustainable agriculture: Food safety

**Shashi Bhushan Vemuri**
Food Hyhene Bureau of Jamaica, India

As the world population continues to grow, much more effort and innovation will be urgently needed in order to sustainably increase agricultural production, improve the global supply chain, decrease food losses and waste, and ensure that all who are suffering from hunger and malnutrition have access to nutritious food. Many in the international community believe that it is possible to eradicate hunger within the next generation, and are working together to achieve this goal. Agriculture is both a cause and solution to environmental problems. Agriculture is linked to biodiversity loss and climate change. However, sustainable agriculture also has the unique potential to mitigate climate change and strengthen resilience to the impacts of climate change. Food security is monitored in near-real time by different organizations and initiatives at the international, national, and regional scale. These platforms work by creating the infrastructure for distinct groups of stakeholders to come together and work hand-in-hand to solve the economic, social, and environmental challenges that affect them all. Vision for sustainable food and agriculture is therefore important for the world in which food is nutritious and accessible for everyone and natural resources are managed in a way that maintain ecosystem functions to support current as well as future human needs. Sustainable agriculture plays a vital role in the economies of both under-developed and developed countries. This role is more vital for agricultural countries. The first task is to achieve a state of food security for all the population through sustainable agriculture. Sustainable agriculture includes the investment of available natural resources, the employment of all potential opportunities for the rural population, and agricultural raw materials to increase agricultural exports

**Keywords:** Sustainable agriculture,biofertilizers,food security,malnutrition

**Biography**:

Prof. Shashi Vemuri F.R.E.S, FRSPH Formerly Senior Professor, university head of entomology has 38 years experience in different capacities as Professor/ Researcher and Extension scientist, Administrator, He participated in various international and National conferences, workshops and has excellent links with many ICAR and State Universities, Universities abroad and leading MNCs. He is a globally travelled Agricultural professional and has strong professional relationships with policy makers, Administrators, farmers organizations and Agribusiness sector with a thorough understanding of the complex socio-economic, political, cultural and environmental aspects of Agriculture in India and other major agrarian economies across the world. His contribution to crop protection, pesticide residues, insect toxicology and innovative methods of farming are widely recognized. He has worked with CIMMYT, Mexico on breeding for Insect Resistance and with ICAR, SAU, WWF International ICRISAT, Major farmers organizations and federations as a Collaborator, contributor and Researcher and with the farmers on innovative technologies in sugarcane, Potato, Ginger and Turmeric.He is involved in farmer empowerment and entrepreneurship development initiatives in agri-ecosystem. He is an Advisor (R & D) for MNC NIHCINO INDIA and also Advisor and scientist of Food Hygiene Bureau, Jamaica. He is the Secretary General and Chief Technical Officer of an established voluntary organization, the Foundation for Agricultural Sustainability and Transformation (FAST) a not-for-profit organization for contributing to Nation building initiatives! Received various awards and Gold medals for outstanding research/ teaching and Extension from the University, Government and other organizations. Travelled number of countries to participate in more than 50 International Conferences and is a member of various Professional Committees and organizations.

## Balanced crop nutrition: A cornerstone for quality food and human health

**Narender K Sankhyan**
Department of Soil Science, CSKHPKV, Palampur, Himachal Pradesh, India

A diverse range of nutrients is required for a healthy and active human life. Good nutrition, or correct food consumption as per the body's nutritional needs, is essential to provide these nutrients. Nutritional quality has been overlooked in the pursuit of a single-minded goal of boosting food grain production for feeding the ever-growing human population. The resulting dietary issues are the major source of worry for about half of the world's population. Fe insufficiency affects 60-80 percent of the world's population, whereas, Zn deficiency affects about 30 percent. Furthermore, over 800 million people, mostly women and children are unable to fulfil even their most basic energy needs. It is, therefore, crucial to producing food of exceptional nutritional quality to address prevalent nutritional deficiencies among individuals. Nutrition begins with what we consume, the food items and eventually, the agriculture sector. To achieve a sustainable agroecosystem, balanced crop nutrition is an integrated strategy to meet the nutritional demands of the crop throughout its life cycle. It includes the use of secondary nutrients, micronutrients, and organic manures in addition to the traditional nitrogen, phosphorous and potassium applications. Managing soil fertility and understanding the nutrient requirements of plants needed for optimal growth are necessary for achieving balanced crop nutrition.

For optimal plant growth and development, 17 essential plant nutrients are essential. Even if all other essential nutrients are present, a deficiency of any of these has a detrimental impact on the crop. A good crop feeding strategy at the farm level can be achieved with a balanced supply of nutrients. Balanced nutrition is essential to obtain high yields and quality produce, moving towards harnessing the crop's maximum genetic potential. The balanced fertilization can, therefore, ensure an optimum supply of each essential nutrient at every growth stage avoiding any over or underuse and optimizing crop productivity while conserving the environment. So, the application of nutrients through the right source with the right application rate at the right time and at the right place is essential. The balanced and precise nutrient application can be done through integrated nutrient management approaches involving the use of synthetic fertilizers and organics. Balanced nutrition of crops can be done through soil test crop response technique, site-specific nutrient management and variable rate technology. Fertigation is also the most efficient method of fertilizer application. Biofortification of crops with the desired quality traits can be a value addition to the produced food. Artificial intelligence (AI) and the internet of things (IoT) can be used for balanced and precise nutrient applications. Information and communication technology can play a role in the dissemination of technology.

To summarize, nutrient-rich food, grown on healthy soil, produced through balanced fertilization, is cardinal for a healthy human population. There has to be a paradigm shift that acknowledges the critical need for agriculture to focus on providing enough food and a balanced diet of high nutritional quality and diversity for all people, guaranteeing healthy and productive lives.

**Audience Take Away:**

- Provide knowledge about the role of a balanced supply of crop nutrients for producing high nutritional quality food
- The presentation will allow the audience to enhance their awareness about the adverse consequences of imbalanced fertilization on the crops
- The lecture will throw light on a practical solution to the widespread nutritional deficiencies among the human population

**Biography**:

Dr. Narender Kumar Sankhyan earned his bachelor's degree in agriculture from Himachal Pradesh Agricultural University in 1998. He received his M.Sc. degree in Agriculture in 1992 and Ph.D. in Soil Science in 1997. He joined as a Scientist in October 1998 and became Senior Scientist in 2007 before being elevated to Principal Scientist in 2013. Now serving as the Head, Department of Soil Science in Himachal Pradesh Agricultural University. He has published 51 peer review research papers, contributed/publishes 5 books/book chapters, 3 practical manuals and 1 atlas. He has supervised 9 M.Sc. and 3 Ph.D. students and currently guiding 5 Ph.D. and 2 M.Sc. students. He has delivered keynote addresses at national and international conferences. He has organized 3 nation seminars and has received the best publication award, best paper award and second-best presentation award. He has handled 11 research projects as Principal Investigator and 9 as Co-Principal Investigator.

# On some aspects of adequacy of the sample sizes at different stages of sampling for estimation of area, yield and production of food grain crops in India

**Krishan Kant Tyagi**
ICAR-Indian Agricultural Statistics Research Institute, India

India is a vast agrarian country having geographical area of 329 million hectares. It is divided into 28 States and 08 Union Territories (UTs are administered by the President through an Administrator appointed by him/her). These comprise of 750 Districts and a total of 628,221 Villages. Around 70 per cent of India's population (around 1.360 billion) lives in Villages. There are good number of food grain crops and non-food grain crops grown during the entire Agricultural Year (01 July to 30 June of subsequent year). An Agriculture Year is divided broadly into three seasons, namely Kharif (July-October), Rabi (November-April), Summer (May-June). For effective planning concerning arranging feeding the vast population of human and livestock, the estimation of total production of food grains and non-food grains is of paramount importance. In India, the estimation of yield rates of food grain crops is done on the basis of Crop Cutting Experiments (CCEs) conducted in majority of States/UTs under the National Programme of Crop Estimation Survey (CES). At district level, the sampling design adopted usually is stratified multi stage random sampling. Presently, around ninetyfive per cent of the total food grains production is estimated on the basis of yield rates obtained from these CCEs conducted on scientific basis spread over various States/UTs. Around more than one million CCEs (of different sizes and shapes) are conducted covering 52 food crops and 16 non-food crops. The conduct of such a large number of CCEs had been in question since long. Accordingly, a high powered committee constituted by Ministry of Agriculture & Farmers Welfare (MoAFW), Government of India (GoI), has recommended for reducing the sample sizes at different stages of sampling, which is highly being criticized and debated.

In India, the Directorate of Economics and Statistics (DES) under Department of Agriculture & Cooperation (DAC), MoAFW, GoI, releases estimates of area, yield and production of main food grain crops, oilseeds, sugarcane, fibers and important commercial and horticulture crops. These crops together account for nearly eightyseven per cent of the total output of agriculture. The estimates of crop production are obtained by multiplication of area estimates by corresponding yield estimates. Therefore, the estimates of area and yield rates assume immense importance in the entire gamut of agricultural statistics.

The need for timely, reliable and comprehensive statistics on area, yield and production of crops assumes special significance in view of the vital role played by the agriculture sector in the Indian Economy. The primary responsibility for collection of statistics of land use and area under crops following prescribed procedures rests with the various State Departments. The yield rates of principal crops are estimated through General Crop Estimation Survey (GCES) conducted by State agencies following scientific techniques of random sampling.

Field Operations Division (FOD) of the National Sample Survey Office (NSSO) under the Ministry of Statistics and Programme Implementation (MoSPI), GoI has the overall responsibility for providing technical guidance to States/UTs in developing suitable survey techniques for obtaining reliable estimates, assistance in training of staff and exercising supervision. Under the Improvement of Crop Statistics (ICS) Scheme which was taken up during 1973-74 with the objective of locating, through the joint efforts of NSSO and State Governments, the deficiencies in the system of crop statistics by exercising technical supervision over the primary field work and suggesting remedial measures for improving the system. To achieve this, sample checks on area enumeration, and area aggregation are carried out in a sample of about 10,000 villages in each season and on conduct of around 31,000 CCEs during an agricultural year.

Data pertaining to CCEs for different crops, having smaller sample sizes, pertaining to good number of States under ICS scheme obtained from NSSO was statistically analysed. Estimates of average yield pertaining to various food grain crops along with estimates of their percentage standard errors were worked out. It was observed that estimates of average yield for the two major crops viz. wheat and paddy have been obtained with suitable degree of precision, however, for minor crops like maize, barley,

jowar, ragi etc., these were obtained with higher percentage standard errors. Sample sizes at the primary stage of sampling i.e. Villages have been worked out for estimation of average yield of different crops for different levels of margin of errors.

Data pertaining to area for different crops pertaining to different districts (20 survey numbers in a village) of some States under ICS scheme were obtained from NSSO and analysed. Estimates of total area under different crops were obtained with estimates of very high percentage standard errors. However, these have also been worked out, had the sample size would have been increased from 20 survey numbers to 100 survey numbers. In that case, the percentage standard errors decreased significantly for number of crops.

The main finding in this study was that on the basis of smaller sample sizes, the estimates of average yields of two major crops i.e. paddy and wheat may be estimated with suitable degree of precision in those States in which these crops are being grown as major crop. However, for other crops, these sample sizes may not be adequate for estimating the average yields of these crops with suitable degree of precision. For estimating these with permissible margin of errors, the sample sizes for these crops would have to be increased suitably.

**Biography:**

Krishna Kant Tyagi Specialized in conducting pilot/large scale sample surveys including data collection in the field of Agriculture including Mechanization, he has 37 years of experience in research and training, and over 65 publications, and On the basis of valuable contributions to Teaching at IARI (deemed University), Pusa, New Delhi, India, nominated by Dean P.G. School IARI New Delhi for the Best Teacher Award in Agricultural Statistics discipline (1998, 1999 and 2000), and he is the director General ICAR's Nominee for Departmental Promotion Committee (DPC) meetings for promotion of ARS Scientist (Ag. Stats) at some ICAR Institutes

# SPEAKERS

## DAY 02

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

12-13 SEPT

# Modification processes of Pea Protein Isolates (PPI) for the development of functional colloidal systems

**Davide Odelli[1,2]*, Antonio Fernaneds de Carvalho and Federico Casanova[2]**
[1]Departamento de Tecnologia de Alimentos, Universidade Federal de Vicosa (UFV), Vicosa 36570-900, Minas Gerais, Brazil
[2]Research Group for Food Production Engineering, National Food Institute, Technical University of Denmark, SøltoftsPlads, 2800 Kongens Lyngby, Denmark

The consumer's increasing awareness of healthy and sustainable food products have recently enhanced the demand for plant-based proteins as food ingredients worldwide. Pea protein isolate (PPI) is extracted from *Pisum sativum*, which is the European most cultivated protein source, and it is employed in the food industry as a functional ingredient thanks to its gelation and emulsifying properties. Pea proteins are being considered as a valid alternative to animal proteins and have been consequently used to increment the offer of vegetarian and vegan food products. Moreover, they are also preferred to soy proteins since manifest lesser allergic reactions when added into food formulations. Since many food products come as a colloidal system *i.e.* foams or emulsions, emulsification and foaming are two main functionalities provided by proteins when used as ingredients. However, due to their large and compact structure, PPI physicochemical properties are limited, thus compromising their employment. Different methods such as hydrolysis, ultrasound treatment and biopolymer interactions were explored to improve PPI functional properties. In this presentation, the results of these modification processes for the development of different colloidal systems are here presented and discussed. In particular, the interaction of pea proteins with fish skin gelatin has been evaluated as possible method to increase foaming properties of a solution as well provide a sustainable use for a food industry by-product. On the other side, by playing on the ionic strengths and hydrolysis process, we demonstrate that the viscosity and interfacial properties are affected, giving the possibility to tailored new beverage products. Finally, the complexation of pea protein with the polysaccharide glucomannan, recognized to have weight management properties, was explored, opening the possibility to develop high protein rich beverages and weight management foods.

**Audience Take Away:**

- Different methods were studied to improve PPI functional properties and thus, their employment
- PPI represent a valuable candidate to replace animal proteins and reduce the environmental impact of food industry
- PPI can be used to develop high protein foods and increment the offer of vegetarian and vegan products
- Colloidal systems such as foams and emulsions can be stabilized by the interfacial properties of PPI

**Biography:**

Mr Davide Odelli studied at the Catholic University of the Sacred Heart in Piacenza, Italia and graduated as MSc. in 2020. He then started a PhD program at the research group of Prof. Antonio Fernandes de Carvalho at the Federal University of Viçosa, Brazil (UFV). His research topic is mainly focused on the role of plant-based hydrocolloids in stabilizing different colloidal systems. In 2021 he moved to Technical University of Denmark (DTU) as Guest Ph.D. student started an ongoing scientific collaboration with prof. Federico Casanova at the Kongens Lyngby, Denmark.

## Evaluation of some functional properties of enzymatically extracted oat protein

**Darius Sargautis*, Tatjana Kince, Ilze Gramatina**
Department of Food Technology, Latvia University of Life Sciences and Technologies, Latvia

Oats are famous within the crops as containing relatively high protein content. In addition, the nutritional value of oat protein is one of best when comparing it among the commercially available crops. As for now, there was little known about the commercially available highly concentrated oat protein. Typically, extraction and concentration of oat protein for its further investigation assumes that oat material is being treated in alkaline media. Such a harsh treatment imposes initial awareness that oat protein has passed modification and structural changes at the very beginning of the extraction. Subsequently, discussed results might be considered being valid within the frame of such a concentration method only. Current research was conducted to reveal the recovery of the oat protein free from insoluble fiber from oats by applying enzymatic treatment. Rolled oats (flakes) were treated in aqueous medium by thermostable alpha amylase (from Bacillus Licheniformis) and xylanase (from Trichoderma reesei) enzymes hydrolyzing, starch and non-starch polysaccharides respectively. In addition, functional properties, like protein solubility or foaming capacity were investigated. Amino acid content was identified to support study of protein redistribution within the streams performing extraction. The study revealed that solubility of the enzymatically extracted oat protein was very limited within the all investigated range of pH, which was set from 3 to 9. The obtained data revealed that oat protein was tending to demonstrate functional properties specific to proteins of high hydrophobicity and high molecular mass aggregates. The resulted oat protein concentrate could successfully be further applied in applications requiring specific properties of oat protein, emphasizing its nutritional value and high insolubility.

Acknowledgments: This study was carried out in the framework of the project "Transition to the new doctoral funding model at the Latvia University of Life Sciences and Technologies" (ES32)
Keywords: oat, protein, enzymes, functional

**Biography:**
Darius Sargautis studied Engineering technology, Lithuania and graduated with B.S. degree in 1999. He is currently pursuing Dr. Sc. Eng. degree with a Food Technology emphasis in Latvia University of Life Sciences and Technologies, Latvia.

## Balanced use of plant nutrients for food security

**Raj Paul Sharma* and Narender K Sankhyan**
Department of Soil Science, CSK HP Agricultural University, Palampur, Himachal Pradesh, India

The ever-increasing population and shrinking natural resource base have posed a major challenge for agriculture across the globe to ensure food security while adopting sustainable and efficient agriculture. Nutrient management plays a pivotal role in sustaining crop productivity. Balanced fertilization is the key to enhancing nutrient use efficiency for sustainable food production. Balanced fertilization entails not only the application of a certain proportion of N, P, and K (or other nutrients) in the form of fertilizers but also the integrated application of organic manures and synthetic fertilizers to the soil. Integrated use of fertilizers and organics leads to improved soil health, while imbalanced fertilization to soil degradation and nutrient mining. Soil acidity has been recognized as a major production constraint worldwide that adversely affects agricultural production directly or indirectly. Long-term fertilizer studies provide an ideal base to evaluate the impact of different nutrient management strategies on soil health, crop productivity and sustainability. A long-term fertilizer experiment is ongoing in the northwest Himalayas since 1972-73 to see how balanced fertilization versus imbalanced fertilization affects the productivity of maize and wheat and soil health. For integrated use of chemical fertilizers (100% recommended dose of NPK) and farmyard manure, the average yield for 49 years, was 4860 and 3075 kg/ha for maize and wheat, respectively. The application of lime has proved equally effective in enhancing the productivity of maize and wheat. The yield under 100 percent NPK + lime was 4264 and 2842 kg/ha, respectively. Continuous cropping for the last five decades with nitrogen fertilizer alone reduced grain yields of both crops to zero after 22 crop cycles. Balanced application of nutrients recorded a higher sustainable yield index (SYI) as compared to imbalanced fertilization. The application of nitrogen and phosphorus without sulfur and potassium resulted in a substantial reduction of grain yields of maize and wheat. Nutrient uptake was also positively influenced by integrated use of fertilizers and farmyard manure as well as lime. The use of nitrogenous fertilizer alone aggravated the problem of soil acidity by decreasing the soil pH from 5.8 to 4.4 after five decades. Omission of potassium and sulfur also reduced the available amounts of these nutrients in the soil. Carbon sequestration was higher under balanced use of nutrients as compared to imbalanced fertilization. The findings clearly demonstrated that imbalanced fertilization poses a threat to the sustainability of the agricultural production system and the maintenance of soil health. In order to attain food security, the use of chemical fertilizers in a balanced manner is vitally necessary for sustaining maize and wheat productivity. Amelioration of soil acidity through lime is a beneficial proposition to boost crop productivity in acid soil regions. Balanced and judicious use of fertilizers is necessary for increasing nutrient use efficiency and securing a higher yield of crops in a sustainable manner.

**Audience Take Away:**

- Need for a balanced supply of plant nutrients in ensuring food security and human health
- The audience will have a better understanding of the negative effects of the long-term imbalanced fertilization on crops and soil health
- Educate the students about the management of soil health and acid soils

**Biography:**

Dr Raj Paul Sharma obtained B. Sc. (Agriculture) (1990), M. Sc. (Agriculture) Soil Science (1992), Ph. D. Soil Science (1996) degrees from CSK HP agricultural University, Palampur, Himachal Pradesh, India. He started his professional carrier as Assistant Scientist (Soil Science) in 1998 and presently serving as Principal Scientist (Soil Science) since 2013. His field of specialization and area of research interest is Plant Nutrition and Soil Health Management. He is Principal Investigator/Centre Incharge of All India Coordinated Research Project on Long -term Fertilizer Experiments at Palampur centre (Himachal Pradesh, India) since 2010. He has published more than 70 research articles in the journals of repute. He is involved in teaching of under-graduate, post graduate and Ph. D courses. He has guided 11 M.Sc. students and guiding 3 Ph. D & 3 M. Sc. students currently.

# Integrated farming system for food and livelihood security

**Sanjay Kumar Sharma*, Pawan Pathania, Suresh Kumar Sharma and SC Negi**
Department of Agronomy, CSK HP Agricultural University, Palampur, Himachal Pradesh, India

Food security is the prime issue across the globe for feeding ever-growing population coupled with shrinking natural resource base. The continuous diversion of already limited cultivated area under the plough, particularly in North-Western Himalayan region towards other development activities like construction of roads, buildings and industrial sector has further aggravated the problem of providing sufficient food and livelihood security to the masses. Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with more than 82 percent of farmers being small and marginal. Existing crop based systems do not provide sufficient round the year production and income to meet the requirement of relatively larger family size of such households. We have to look for a system which is capable of providing food, fibre, fruits, milk, nutritious diet and round the year employment to small and marginal farmers. Integrated Farming System (IFS) based on scientific validation involving various components like crops, fodder, vegetables, fruits, livestock and agroforestry is the ultimate solution for providing the food and livelihood security. Further, the IFS also addresses the identification of most appropriate combinations of various farm activities/enterprises that are synergistic and complementary to one another. Integrated farming system model developed in the North-Western Himalayan region can provide sustainable livelihood to marginal and small households. Such One hectare IFS model developed at CSKHPKV, Palampur (HP), India comprising various components as crops (0.65 ha), horticulture including vegetables (0.175 ha), fodder, agroforestry and border plantation etc. (0.1ha) and livestock, mushroom, poultry and vermicomposting unit (0.075) has proven to be very efficient in sustaining the farmers' income and providing round the year employment. The latest findings from this model revealed gross returns and net returns of more than Rs. 4.45 lacs (5855 USD) with net returns of more than Rs. 2.15 lacs (2830 USD). The highest net returns were obtained from livestock followed by cropping system. This model also generated employment for over 370 mandays. Though rice cultivation, livestock and poultry are known for generating more amount of greenhouse gases but inclusion of agroforestry, fodder and horticulture components neutralized their effect on the environment by serving as carbon sink. The developed IFS model and even smaller models proposed by us may be applicable and effective in North-Western Himalayan region having similar climatic and geographical conditions.

**Audience Take Away:**

- Need for Integrated farming system approach for ensuring food and livelihood security
- The audience will have a better understanding of components of integrated farming system model.
- The students would be encouraged to develop such models by choosing location specific and need based components

**Biography:**

Dr Sanjay K Sharma obtained B. Sc. (Agriculture) (1986), M. Sc. (Agriculture) Soil Science (1989), Ph. D. Soil Science (1992) degrees from CSK HP agricultural University, Palampur, Himachal Pradesh, India. He started his professional carrier as Assistant Professor (Soil) in 1995 and presently serving as Professor (Soil) since 2009. His field of specialization and area of research interest is Plant Nutrition and Soil Health Management. He has remained Principal Investigator (PI) of All India Coordinated Research Project (AICRP) on Soil Test Crop Response Correlation during 2009-10, PI, AICRP on Micro-and Secondary Nutrients and Pollutant elements, (2010-12), Chief Scientist, AICRP on Irrigation Water Management (2016-2018) and presently serving in AICRP on Integrated Farming System at Palampur centre. He has published more than 70 research articles in the journals of repute. He is involved in teaching of under-graduate, post graduate and Ph. D courses. He has guided 11 M.Sc., 1 Ph.D students and is guiding 3 Ph. D & 4 M. Sc. students currently.

# Micronutrients in ensuring food and nutritional security in North Western Himalaya

**Pardeep Kumar[1]*, Arvind K. Shukla[2], N.K. Sankhyan[1], N P Butail[1], Pratibha Thakur[1], Devanshi Baghla[1], Deepika Suri[1], Munish Kumar[1], and Praveen Kumar[1]**

[1]Department of Soil Science, CSK HPKV, Palampur, Himachal Pradesh, India

[2] Indian Institute of Soil Science, Bhopal, Madhya Pradesh, India

Agriculture, with its associated sectors, is the principal source of livelihood in the North-West Himalayan (NWH) region of India. However, only 15% of the farming community is producing enough food to make their ends meet. Studies of NWH region depict the deficient status of different soil nutrients (macro- and micronutrients), a major contributor to the low crop yields. Besides low productivity, the people of the region are dealing with colossal problem of micronutrient malnutrition. However, such deficiencies are more prevalent in the rural region of NWH which dominantly relies on cereal-based diet. Although green revolution has led to self-sufficiency in cereal production, but the dependency on cereal-based diet has unknowingly excavated the problem of micronutrient malnutrition. The challenge, therefore, is to meet the food and nutritional need of the people residing in this region. In general, micronutrient cations (Cu, Mn, Zn, and Fe) deficiencies are associated with alkaline soils, whereas, anions (B and Mo) deficiencies are more pronounced in acid soils. The deficiencies of the aforesaid micro-nutrients affect the crop yields and the nutritional quality of the produce, hence, is a major constraint to achieve the goals of food and nutritional security. These micronutrients are essential for plant growth and development with indispensable benefit to human health. Several researchers documented a significant increase in crops yields ranging from 5-30 % with the application of micronutrients. The response, however, is the function of soil types and crop management practices. Moreover, the optimum application of these nutrients contribute to better nutritional composition of the harvest viz. total soluble salts (TSS), Zn content, ascorbic acid, protein and starch. In acidic soils the application of B and Mo documented an increase of 10-22% and 15-28%, in cereals and vegetable crops respectively. From the field experiments conducted at the sub humid mid hill region of NWH, application of Zn at economically optimum rate of 5.93 kg Zn $ha^{-1}$ significantly enhanced the productivity of maize-wheat cropping system. Beside this, many genotypes of different crops (maize, wheat, okra and cauliflower etc.) were also identified for different soil types which are more responsive to external micronutrients (Zn and B) application. Furthermore, the foliar application of micronutrients in chelated form beside enhances the crop productivity, improves the nutrient uptake and their apparent recovery, thus, minimizes the negative environmental impacts. Micronutrient's application not only proves to be more productive with nutritionally rich harvest, but also have positive economic benefits. Furthermore, micronutrients application had a great potential in strengthening/enhancing the immunity in humans, need of the hour in compacting the heftiest challenges of ongoing COVID-19 pandemic. To conclude, due attention on micronutrients application will play a vital role in achieving food & nutritional security and sustainability goals. However, for realizing the yield potential of crops, the optimum management of micronutrients is very essential. Further, there is a need revisit the availability limits for different crops and soil types of the region.

**Audience Take Away:**

- The significance of micronutrients in food and nutritional security
- This will certainly help the concerned audience to learn and understand the role of micronutrients in food quantity and quality; humans are consuming. Definitely other faculty should include the micronutrients in research pursuits and teaching as well considering their role in human health and environment management. Yes, it is the only practical solution to have the balanced and nutrient rich food stuff. To meet the sustainable development goals, soil and nutrient management strategies should be the central focal point

**Biography:**

Dr. Pardeep Kumar, Ph.D. in Soil Science in 1996 from CSKHPKV, Palampur, India, started his carrier as Assistant Scientist (Soil) in 1998 in the same Institute, elevated to the position of Principal Scientist (Professor) in 2013. He is a pioneer worker in the field of systematic micronutrient research and has contributed significantly by publishing a geo referenced Atlas on Micro and Secondary Nutrients' status. Evaluated different sources of Zn and B for enhancing their use efficiency and nutritional quality in different crops. Identified micronutrient efficient genotypes of cereals and vegetables. He has published more than 80 peer reviewed research papers.

## Harnessing the latest innovations and laying foreground for future of food science and technology

**Jolly Rajat**
Pwani University, Kenya

The Kenyan coastal forests in Kilifi have been preserved as Kaya forests under the management of local communities. Eleven (11) out of the more than 50 Kaya forests have been gazetted as national heritage sites. The diversified vegetation in these forests has fulfilled the livelihoods of communities residing around them. A study was conducted to document the knowledge on indigenous food plants and their uses in the communities around Kaya Kauma and Kaya Tsolokero for purposes of documentation. The survey targeted the general population, Kaya elders and herbalists. The population was surveyed on the basis of gender, age, marital status, level of education, main occupation and their relationship to the village. The data was then analysed using Kruskal-Wallis H Test using SPSS Statistics for significant differences between knowledge among the categories of population. This analysis showed significant difference between various categories of population studied. The Kauma forest is surrounded by eighteen (18) villages while Kaya Tsolokero has eight. Influence of education and has contributed to a decline in the indigenous knowledge. The number of food plants documented were 47 and 57 food plants from Kaya Kauma and Kaya Tsolokero, respectively. The number of plants listed by the communities were more than the taxonomically verified plants. The villages around these forests had a total population of 23,617 with 1802 households. Kaya Kauma forest was inhabited by the Kauma, Duruma, Chonyi, Digo, Giriama and Kambe communities while the Chonyi, Giriama, Jibana and Kauma communities inhabited villages around Kaya Tsolokero forest. Kauma community was the most knowledgeable in indigenous flora out of the six (6) tribes living around Kaya Kauma while in Kaya Tsolokero the Chonyi were most knowledgeable among the four (4) communities. It is important to harness this knowledge of communities to improve the livelihoods of the society. This documentation is expected to retain the rich indigenous knowledge of these communities.

**Biography:**

Dr. Jolly Rajat studied Masters in Botany from India at Patna University and graduated in 1999. She did her bachelors in Education 2002. She got her Ph.D from Pwani University, Kenya in 2020. She did the first survey to document ethno-botanical knowledge in communities around sacred African forest of Kaya Kauma and Tsolokero. She studied the biodiversity of these forests and documentation of entire useful flora which aids the communities to sustain their livelihood. She also validated herbal species in use with the communities to demonstrate the efficacy of these plants against common bacteria. She has published 7 research papers. She works as a part time lecturer in the department of Environmental Science in Pwani University in Kilifi, Kenya.

# Effects of varying levels of *Moringa Oleifera* leaf meal on the growth, carcass quality and economics of production of broiler chicken

**Anold Tatah Kong Mbiydzenyuy[1], Kingsley A. Etchu[2]* and Kenneth Ndamukong[1]**
[1]Department of Animal Science, Faculty of Agriculture and Veterinary Medicine, University of Buea-Cameroon
[2]Institute of Agricultural Research for Development (IRAD), Nkolbisson- Yaounde

The prices of broiler feed have been escalating, thereby reducing the viability of the poultry industry in Cameroon. This study was carried out to determine the effects of varying levels of Moringa oleifera leaf meal as substitute for soya beans on the growth evolution, carcass quality and economics of production of broiler chickens. A total of two hundred and twenty five (225) unsexed cobb vantress broiler chicks were allotted to five (05) dietary treatments with forty five (45) birds per treatment in a completely randomized design experiment. Treatment groups were further divided into three (03) replicates with 15 chicks in each replicate. Soya bean meal was substituted weight for weight with Moringa oleifera leaf meal (MOLM) in broiler starter and finisher diets at 0%, 5%, 10% 15% and 20% levels respectively. Birds were fed during the experimental period that lasted for 9-weeks. Data was collected on feed intake, weekly growth rate, feed conversion index and economics of production. At the end of the experiment, the birds were slaughtered, dressed and used for carcass quality. Treatment effect on average feed intake, final body weight, body weight gain, were significant ($P<0.05$) while feed conversion ratio was not significant ($P>0.05$). Inclusion of MOLM in broiler diets significantly ($P<0.05$) affected abdominal fat, thigh and feet yields but showed no significant difference for breast, drumstick, head, neck, gizzard, liver, heart, spleen, proventriculus and pancreas. It was concluded that Moringa oleifera leaf meal (MOLM) can only be included in the feed to levels up to 10% as higher levels affected feed intake and final weight gain although cost incurred per kilogramme feed was lower for birds on Moringa diets than birds on the control diet. Further study is needed on the yellow colour of the carcass and acceptability by consumers.

**Audience Take Away:**

- Situating production constraints of the broiler industry in Cameroon and other developing countries
- Alternative local protein substitutes to livestock production
- Data on the effects of M. oleifera leaf meal (MOLM) inclusion in the diet, growth performance and carcass characteristics of broiler chickens is limited and contradictory
- Knowledge on the nutritional and medicinal properties of MOLM on humans and as feed additive in chickens
- Cost benefit ratio of Moringa oleifera leaf meal and conventional feed in broiler feed diet

**Biography:**

Kingsley Agbor Etchu is a Research Professor with 20 years working experience at IRAD on Animal Nutrition and Physiology, adaptation and climate change, population dynamics as well as capacity building of young researchers, students from National and Foreign Universities, extension workers and farmers. He is the Principal Investigator for the Development of Cameroon National Strategy on Climate Smart Livestock under the Program for Climate-smart Livestock Systems (PCSL) (P167998) of the World Bank. Part-Time lecturer/ Curriculum Development for over 17 years with the Faculty of Agriculture and Veterinary Medicine at the University of Buea, Cameroon. He is Member of Council and Cameroon representative for Global Research Alliance on Agricultural Greenhouse Gasses (GRA). Has published over 45 Articles in Peer Review Scientific Journals, over 20 Technical Reports, 15 Posters; 10 Technical Guide to Farmers and 20 Conference papers, Seminars and Workshops.

## Fast and reliable methods for histamine detection in fish

**Pierina Visciano**
Faculty of Bioscience and Technology for Food, Agriculture and Environment, University of Teramo,Teramo, Italy

The storage of fish at the temperature of melting ice is strongly recommended, if not possible onboard vessels, immediately after capture and throughout the supply chain. However, time/temperature abuse conditions can always occur and the potential for histamine formation in high histidine fish species isof particular concern. Since the presence of histamine has no effect on sensory characteristics of the product, an analytical approach can represent the most important prevention and control tool. The opportunity to check fish for histamine content from fishing to commercialization could avoid or reduce theincidence of scombroid poisoning. A high rate of all seafood-related outbreaks occurred worldwide is due to histamine intoxication, as an allergic-like disease as well as histamine intolerance. Many countries have established maximum limits for histamine in fishery products based on the Codex standard of 200 mg/kg. The United States (US) Food and Drug Administration has adopted the limit of 50 mg/kg, while the EuropeanUnion (EU) food safety criteria correspond to 100 and 200 mg/kg in both raw and processed fish products, except for those that have undergone an enzyme maturation treatment in brine, where the maximum limitis 400 mg/kg. The control of fish and fish products against this hazard is generally carried out according to asampling plan based on EU and US schemes which analyzes respectively 9 or 18 sample units of the same batch. However, fishermen and all other operators along the fish supply chain must not place on the marketproducts with histamine levels above the maximum limits. Real-time monitoring of fish and fish products could be ensured by quick and easy-to-apply analytical techniques directly in the field. A wide range of methods are available today for the determination of histamine in fish, but they are generally time- consuming and require skilled technicians, limiting their application to the laboratory level only. Conversely,new rapid techniques such as colorimetric strip, fast-track lateral flow test, surface-enhanced Raman spectroscopy, molecularly imprinted polymer-based fluorometric assay, nanomaterials based optical and electrochemical sensing, and electrochemical-based biosensors can be used for a preliminary screening of histamine presence during on-site inspection. Among the advantages, some methods are non-destructive and can be performed directly *in-situ*, while others show great agreement with more sensitive and specific systems such as chromatography. The reliable and rapid detection of histamine in fish is essential for food safety and public health, as well as for the global seafood industry. Hence, studies must always be done in search of simple, fast, and accurate methods that can easily be used outside the laboratory.

**Audience Take Away:**

- This topic represents an important tool for both researchers and official control competentauthorities ensuring the health of consumers.
- The described new analytical approaches can be a valid alternative to conventional methodsgenerally applicable only at the laboratory level.
- Further research could expand the knowledge of analytical methods able of verifying the histamine content in fish contributing to a more practical approach for fishermen and both producers and retailers.

**Biography:**

Associate Professor at the Faculty of Bioscience and Technology for Food, Agriculture and Environment, University of Teramo (Italy) and teacher of Food Legislation in the master double degree in Food Science and Technology with the Chulalongkorn University (Bangkok, Thailand). Graduated in Veterinary Medicine,PhD in Inspection of Food of Animal Origin, and Specialist in Food Inspection. The research activity focuses on chemical hazards such as biogenic amines, veterinary drugs, and environmental contaminants (i.e., mycotoxins, heavy metals, polycyclic aromatic hydrocarbons, and marine biotoxins). Author/co-author of many scientific papers on such topics in indexed international journals.

## Probiotics and developmental programming

**Diana Catalina Castro Rodriguez**
Cátedras, CONACYT. Instituto Nacional de Ciencias Medicas y Nutricion Salvador Zubiran, Mexico City, Mexico

It consists of basic concepts about the origin of the microbiota, how it is modified by maternal nutrition, the effects on offspring development, and possible interventions using functional foods, mainly probiotics as alternatives to prevent or improve the negative effects of poor maternal programming and its effect on the microbiota.

**Audience Take Away:**

- Importance of adequate nutrition in early stages of development such as pregnancy and lactation
- Beneficial effects of the use of probiotics in fat reduction.
- Characterization of bacteria with probiotic potential

**Biography:**

Diana C. Castro Rodríguez has PhD in Science in Bioprocesses. She is currently a young researcher from CONACYT.She has carried out two research stays, one at the Institute of Agrochemistry and Food Technology, Valencia, Spain and another at Texas Biomedical Research Institute and Southwest National Primate Research Center, San Antonio, United States. She has three patent application records. She has been awarded honorable mentions for her work in boththe Master's and PhD. Her line of research is aimed at the bio-synthesis of the secondary metabolites of probiotic and their effects in chronic degenerative diseases.

# POSTERS

## DAY 02

4TH EDITION OF EURO-GLOBAL CONFERENCE ON

# FOOD SCIENCE AND TECHNOLOGY

12-13 SEPT

# Development of extruded ready-to-eat snack based on unripe plantain flour and corn grits

**Natalie N. Rivera-Agosto and Rosa N. Chavez-Jauregui***
Food Science and Technology Program, University of Puerto Rico at Mayaguez Campus, Puerto Rico,United States of America

Plantains (Musa paradisiaca L.) are an economically important crop in tropical and sub-tropical regions around the world. Plantains are a staple food in Puerto Rico, they are consumed in many traditionaldishes such as mofongo, tostones, and platanutres. Starch is the main component of their carbohydrate content. Plantains, a non-grain starch staple can be used as an ingredient or processing aid in the food industry. Post-harvest preservation is required for plantain crops because of their high perishability and fastdeterioration. Extrusion is a pressure-cooking system at high temperatures, which can serve as a fast and versatile method of processing foods into ready-to-eat snacks. This study aimed to develop a ready-to-eat snack based on unripe plantain flour (87.5%) and corn grits (12.5%) using extrusion cooking to offer a new product in the local market. Unripe plantains (ripening stages 1 to 3) from the Maiden cultivar were processed into flour. The extrusion was optimized by response surface methodology (RSM). A single screw laboratory extruder with a compression ratio of 4:1 was used. A central composite rotatable design was used, where the independent variables examined were feed moisture (11% to 15%) and temperature of the barrel central zone (140°C to 160°C). Process variables such as screw speed and die diameter were kept constant at 200 rpm and 3 mm, respectively. The dependent variables examined were expansion ratio, density, shear strength, and shear stress. A sensory evaluation was carried out using a hedonic scale of ninepoints. The panelists evaluated attributes of general acceptance, texture, and taste. The highest expansionratio (3.89 - 0.28) and lowest density (0.211 mg $mm^{-3}$ 0.03) were obtained at the feed moisture content of 13% and central zone temperature of 150°C. Thus, the product obtained under these conditions had a maximum expansion ratio, an appropriate texture, and good acceptance.

**Audience Take Away:**

- Extrusion cooking is an alternative processing method to plantain perishability
- Plantains in ripening stages 1 to 3 can be used in the development of an extruded product
- Plantains, a non-grain starch crop can be an alternative to traditional cereals used in theelaboration of ready-to-eat snacks in the local market

**Biography:**

Dr. Rosa N. Chávez Jáuregui is a professor at the Department of Agroenvironmental Sciences and the Food Science and Technology Program at the University of Puerto Rico, Mayagüez Campus. Dr. Chávez received her Ph.D. and MS degrees in Food Science and Food Technology at the University of Sao Paulo, Brazil. Currently, her laboratory is researching the physical, chemical, functional, morphological, and structural characterization of flours and starches from plantain, tubers, and roots. Dr. Chávez has worked in the following research areas: antioxidant stability and assessment, postharvest of fruits, extrusion process, andvalue-added products.

# Assessment of nitrite and nitrate levels in leafy vegetables marketed in Italy

**Aurelia Di Taranto[1], Giovanna Berardi[1], Valeria Vita[1], Giulia Conversa[2], Antonio Elia[2], Marco Iammarino[1]***
[1]Department of Chemistry, Istituto Zooprofilattico Sperimentale della Puglia e della Basilicata, Foggia, Italy
[2] Department of Agriculture, Food, Natural resources and Engineering (DAFNE), University of Foggia, Foggia, Italy

Nitrate is a natural compound that accumulates in leafy vegetables. High levels of nitrate and nitrite in food can cause some health effects such as methaemoglobinemia and gastric cancer. Thus, the European Regulation No. 1881/2006 established maximum limits for nitrate levels in different types of leafy vegetables such as spinach, lettuce and wild rocket. Nitrite should be present in these vegetables only in traces. However, some recent studies demonstrated that these levels can also reach high levels, higher than 100 mg $kg^{-1}$. The food safety concern in then related not only to the compliance of nitrate level with the legal limit but also to the possible presence of nitrite at high level. In this last case, the scenario is more complex, since no legal limit is defined, and nitrite is considered as the direct precursor of N-nitrosamines, well-known pro-carconogenic conpounds.

In this monitoring, 230 samples of leafy vegetables (75 lettuce, 75 spinach, 50 swiss chard and 30 wild rocket) were collected on the Italian market and then analysed for the determination of nitrite and nitrate by using validated and accredited analytical techniques based on ion chromatography with conductivity detection. The first technique, based on traditional ion chromatography, was used for analysing all samples, the second, based on capillary ion chromatography, was used for confirmation of analytical results whne the samples showed nitrate concentration higher tha the legal limit and/ot nitrite concebtration higher than 50 mg $kg^{-1}$.

Nitrites were detected at high concentrations, in the range 66.5-219.5 mg $kg^{-1}$ wet weight, in 7 samples (1 lettuce, 3 spinach, 1 swiss chard and 2 wild rocket), confirming that further EU limits and new research are needed on this type of contamination. This research should be especially focused on the individuation of the mechanisms responsible for the formation of such compound, and the elaboration of specific strategies for industry focused at eliminating/reducing the presence of nitrite in leafy vegetables. Regarding nitrate, concentrations higher than the respective EU limits were detected in 20 samples (5 lettuce, 4 spinach and 11 wild rocket), confirming the need of official control. Interesting results were also obtained for swiss chard, in which, despite no EU limit have been defined so far, the average nitrate level resulted higher than those recorded for spinach and lettuce. This results suggests the definition of EU limits also for this type of leafy vegetable.

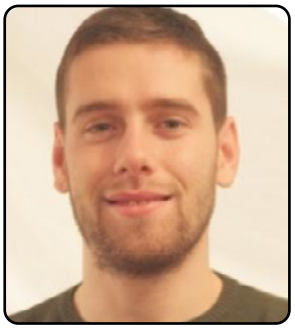
This work was supported by the Italian Ministry of Health who financed the Research Project code IZSPB 07/20 RC.

**Audience Take Away:**

- The audience will be updated about a significant aspect of vegetables safety
- Novel analytical methods and new findings will be described
- The research could be used by other faculty to expand their research or teaching
- The research suggests to provide new legal limits for nitrite and nitrate in leafy vegetables
- The research suggests the development of new research for identifying the possible sources of nitrite in leafy vegetables

**Biography:**

Since 2002, Researcher of Istituto Zooprofilattico Sperimentale della Puglia e della Basilicata of Foggia (Italy). Editorial board member of J Food Compos Anal, Front Nutrition, Appl Sci-Basel. Publons/Clarivate Top 1% Peer Reviewer 2018 and 2019. Listed in ReviewerCredits top reviewers 2020. Member of EFSA, ISO and UNI working groups. Author of more than 170 articles published in International and National Journals, Conference Proceedings and books.



# Valorization of raspberry seeds using acidic NADES: A preliminary study

**Nemanja Teslic[1]*, Filipe Oliveira[2], Filipa Santos[2], Alena Stupar[1], Milica Pojic[1], Anamarija Mandic[1], Branimir Pavlic[3], Aleksandra Cvetanovic[3], Ana Rita C. Duarte[2], Aleksandra Misan[1]**

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By-products of raspberry seeds fruit processing industry are rich in bioactive compounds. Ellagic acid (EA) is a polyphenol naturally present in raspberry seeds which has antioxidant, hepatoprotective, antimicrobial, anti-carcinogenic, anti-inflammatory activity, among other interesting bioactivities. EA majority is bonded in the form of ellagitannins (ETs) which have lower bioactivity when comparing to EA. Hence, ETs have to be hydrolysed to EA. Classical acid hydrolysis of ETs requires utilization of mineral acids (e.g. HCl) and alcohol (e.g. MeOH) which are detrimental for human health and hazardous for the environment. Natural Deep Eutectic Systems (NADES) composed of e.g. citric acid and betaine could serve as alternative medium for the hydrolysis process. This would allow to production edible, non-toxic and ready-to-use extracts which could be further used in food and cosmetic industry. Hydrolysis of ETs to EA using NADES is determined by numerous parameters (e.g. temperature, time, molar ratio of citric acid and betaine in NADES, water content in NADES, NADES/plant ratio etc.) and process optimization with all variables could be time consuming, inefficient and expensive. Thus, it is necessary to reduce their number and determine the most influential variables prior to final optimization step. For that purpose, 25-1 factorial experimental design was applied with a total of 16 experimental setups. The obtained extracts were analysed in terms of EA content which was determined by HPLC method, total polyphenol content analysed with Folin-Ciocalteu procedure and in vitro antioxidant activity determined by DPPH assay. Among all selected variables, NADES/plant ratio, temperature, and time, exhibited the highest impact on EA content, thus, these parameters should be selected for the final optimization step.

**Acknowledgment/Funding:** Authors would like to thank the Ministry of education, science and technological development of the Republic of Serbia, Grant No. 451-03-9/2021-14/ 200222; the Science Fund of the Republic of Serbia, PROMIS, Grant No. 6060592, DEStiny; and the European Union, Horizon 2020 (European Research Council), Grant no ERC-2016-CoG 72503 for the funding.

**Audience Take Away:**

- Alternative ways to perform hydrolysis with chemicals that are edible and non-toxic
- Which are the most influential variables driving the hydrolysis process
- Solution how to use underutilized raspberry seeds as raw material for extracts enriched with ellagic acid
- More info about Natural Deep Eutectic Systems and their applications

**Biography:**

Dr. Nemanja Teslić studied Food Technology at the University of Novi Sad, Serbia, and graduated as Bcs and Msc in 2012. and 2013., respectively. In 2018. he received PhD degree at Department of Agricultural and Food Sciences at the University of Bologna, Italy under supervision of prof. Andrea Versari. In 2019. he obtained the position of Research Associate at the Institute of Food Technology, University of Novi Sad. During 3 months in 2020/2021. he completed postdoctoral fellowship supervised by prof. Ana Rita Duarte at Departamento de Química Nova School of Science and Technology. He has 26 published articles in SCIE journals.

# Protein hydrolyzates of quinoa leaf by in vitro digestion

**Alma Vazquez-Luna[1,2*], Diaz-Sobac R.[1,2], Fuentes Carmona F.F.[3] and Cadena Martinez L. P.[2]**
[1]Instituto de Ciencias Basicas
[2]Facultad de Quimica Farmaceutica Biologica, Universidad Veracruzana, Xalapa, Veracruz, Mexico.

At present, the consumption of foods that can supply the consumption of meat has increased. This is due to the environmental impact caused by its production, as well as the damage to health that has been reported in recent studies. Quinoa (Chenopodium quinoa Willd) a plant native to South America whose consumption has recently focused on the leaf, because it can be consumed raw or cooked. In addition to its protein content and a high content of very important secondary metabolites, however, gastric, and duodenal digestibility in vitro has not yet been evaluated to determine how much of the protein that is ingested can be absorbed to be used by the body. The objective of this work was to evaluate the above, through the elaboration of defatted quinoa leaf flours, to which protein isolates were made at pH 2, 4 and 6. Subsequently, the isolates were hydrolyzed by gastric simulation with the papain enzyme at pH 2 because it was the pH with the highest yield, SDS-PAGE electrophoresis was run for proteins identification. Simulated duodenal digestion was carried out with the enzyme pancreatin and bile solution. Protein concentration was higher for pH 6. In both oral and gastric simulation, it was determined that the main proteins were globulins and albumins. In the duodenal phase no protein was observed. According to the values obtained, it was concluded that the proteins present in quinoa leaves have excellent digestibility and therefore can be absorbed through the duodenum.

**Keywords:** Quinoa leaf, protein identification, digestibility.

**Audience Take Away:**

- Attendees will learn about a new source of food, it is known that vegetables can have proteins, but they do not know if their body can digest and absorb them at the intestinal level
- Yes, because they can apply it for some other vegetable or plant that is of interest to them and that they wish to check if their digestibility is possible
- The work offers an alternative for people whose diet does not include meat, either due to illness or self-choice

**Biography:**

Dr Alma studied Chemistry at Universidad Veracruzana, México and then joined the research group of Institute of Basical Sciencies, Universidad Veracruzana. She received her PhD degree in 2011 at Universidad Autónoma Metropolitana, at the same time She creats her line research in: Biomolecule's functionality in vegetables and fruits when she obtained the position of Researcher in Universidad Veracruzana. After one year she registered her academic group as UV-CA-368. In 2015 she obtained the level one on the System National Researchers. She has published more than 30 research articles in SCI(E) journals.) She has directed more than 50 theses of pre and postgrade.

# Participants List

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| Yoav Banitt<br>FarmerJoe Bot, Robotic Perception, Israel | **23** |

# UPCOMING CONFERENCES

2nd Edition of International Conference on

**Probiotics and Prebiotics**

June 19-20, 2023 | Rome, Italy

https://probiotics.magnusconferences.com/

5th Edition of Euro-Global Conference on

**Food Science and Technology**

September 11-13, 2023 | Valencia, Spain

https://food-chemistry-technology-conferences.magnusgroup.org/

## Questions? Contact

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