

Fertilizers from waste: Recovering and reusing nutrients via circular processing of agricultural residues

Conference Organizers



Dr. Chittaranjan Ray
Nebraska Water Center

Dr. Chittaranjan Ray is the director of the Nebraska Water Center and has extensive experience with leadership and as conference organizer. Dr. Ray's research uses mathematical tools and big data concepts to understand water use efficiency and water productivity of irrigated agriculture. He also tries to focus on the overall sustainability of such production systems which examining the potential for soil and ground water, impacts to urban and rural drinking water systems, and future climatic scenarios. Some of the projects of his research group include, development of a water productivity atlas for Nebraska and estimation of water footprint for agriculture and energy related industries operating within Nebraska, integrated assessment of surface and ground water systems to reduce impacts on stream ecosystems in areas undergoing intensive irrigation and assessment of the vadose zone for soil quality and hydraulic properties to develop a publicly database for Nebraska.

Dr. Clinton Williams is the Research Leader of Plant and Irrigation and Water Quality Research units at US Arid Land Agricultural Research Center. Dr. Williams has been actively engaged in environmental research focusing on water quality and quantity for over 20 years. He looks for ways to increase water supplies through the safe use of reclaimed waters. His current research is related to the environmental and human health impacts of biologically active contaminants (e.g. PFAS, pharmaceuticals, hormones and trace organics) found in reclaimed municipal wastewater and the associated impacts on soil, biota, and natural waters in contact with wastewater. His research is also looking for ways to characterize the environmental loading patterns of these compounds while finding low-cost treatment alternatives to reduce their environmental concentration using byproducts capable of removing the compounds from water supplies.



Dr. Clinton Williams
US Arid Land
Agricultural Research
Center, USDA-ARS

Dr. Lisa Durso is a Microbiologist with USDA Agricultural Research Service in Lincoln, Nebraska. Her work focuses on microbial ecology of microbes in manure including antibiotic resistance in agricultural production systems, environmental dimensions of zoonotic foodborne pathogens, water quality and soil health. She began her scientific career working for state and federal public health agencies, served as an Emerging Infectious Disease Training Fellow at the CDC in the early days of the One Health approach, and currently focuses on applied research related to innovate manure-base fertilizers.



Dr. Lisa Durso
US Agroecosystem
Management Research
Center, USDA-ARS



Dr. Jonas Baltrusaitis
Lehigh University



Dr. Júlia Farias Stiles
US Arid Land
Agricultural Research
Center, USDA-ARS

Wednesday Sep 11 2024

Panel 1: Engineering and new Fertilizer Technologies

Presentation title: Solid nitrogen fertilizer recovery from liquid biogenic waste: from new concepts to new technology



Lehigh University

Dr. Jonas Baltusaitis has been an associate professor in Chemical and Biomolecular Engineering at Lehigh University (Bethlehem, PA, USA) since 2019. He received his BS in 1998 and MS in 2000 from Kaunas University of Technology (Kaunas, Lithuania), and he earned a PhD in physical chemistry (Department of Chemistry) from the University of Iowa (Iowa City, IA, USA) in 2007. He currently serves as an inaugural Editor-in-Chief of Sustainability Science and Technology and his academic and educational mission is bringing together research disciplines to help find sustainable solutions in support of a greener economy. His research interests include sustainable process design and catalysis, surface chemistry and analysis, the use of alternative energy sources (light, electrons, plasma) to substitute for conventional thermal reaction pathways as well as developing novel concepts in sustainable nutrient cycling for agriculture. These involve new concepts in nutrient extraction from biomass digestate in a form of solid and stable nitrogen fertilizers.

Presentation title: Optimizing Nutrient Synergy Through the Development of Organomineral Fertilizer Formulations



International Fertilizer Development Center

Dr. Kiran Pavuluri is the Director of Research Development and Innovation of IFDC. He has experience in both academic and industrial settings with a focus on different disciplines of agronomy. He has expertise in screening genotypes for nutrient use efficiency, developing and validating crop response models for variable rate nutrient management, and applying crop models to evaluate spatial and temporal variation to understand and assess yield gaps for major crops globally. Dr. Pavuluri has also established the scientific basis for a new multi-nutrient fertilizer for various crops grown in different soil and climatic environments.

Presentation title: Anaerobic digestion for effective nutrient recycling – opportunities and threats



Lithuanian Research Centre for Agriculture and Forestry

Dr. Vita Tilvikienė is a Chief Researcher in Agrobiology Laboratory and Deputy Director for Research at the Institute of Agriculture, Lithuanian Research Centre for Agriculture and Forestry since 2021.

She earned a Doctor of Agricultural Sciences (Agronomy), with the dissertation “Management of tall fescue, cocksfoot and reed canary grass swards for biogas, biomass quality and energy value”.

Presentation title: Implementation of urine diversion for nitrogen and phosphorus recovery



Arizona State University

Dr. Treavor Boyer is an associate professor in the School of Sustainable Engineering and the Built Environment (SSEBE) at Arizona State University. His projects are broadly focused on water sustainability, and spans drinking water and wastewater treatment, and natural aquatic systems. His research interests span water quality and treatment with numerous projects on innovative applications of ion exchange technology such as contaminants removal from impacted water and nutrient recovery from source separated urine.

Wednesday Sep 11 2024

Panel 2: Prospects and Applications on Nutrients Recovery

Presentation title: Assessment of different nitrogen sources on plant development and cattle supplementation



Dr. Júlia Farias Stiles research focus on links between physiology, mineral nutrition and stressors. She is broadly interested in topics spanning these and other biological fields such as microbiology, ecotoxicology, food security and molecular biology. Current projects address ways to characterize how plants and other organisms are impacted by multiple factors such as mineral nutritional, contamination by pharmaceuticals, micro plastics, PFAS and heavy metals. And how the soil/water availability of these varies depending on environment and crop, and how impacts may be constrained by different factors.

US Arid Land Agricultural Research Center, USDA-ARS

Presentation title: Recycling of grey water nutrients with algal biomass for biofertilization in desert agroecosystems



Dr. Ilya Gelfand is a senior lecturer at Ben Gurion University of the Negev. He is broadly interested in terrestrial biogeochemistry and ecosystem ecology with an emphasis on soil emissions of nitrogen gases. His research covers agricultural sustainability, environmental effects of man-managed ecosystems, and desert soils biogeochemistry. His current research aims to understand nutrients vs. water limitation to deserts productivity, sustainability of desert agriculture, and drivers of soil nitrogen oxides emissions.

Ben Gurion University of the Negev

Presentation title: Potential of reclaimed and manufactured struvite to use as a phosphorus fertilizer in agriculture



Dr. Ganga Hettiarachchi is one of the world's leading scientists in the fields of trace metal and nutrient chemistry in soils. Her research at K-State focuses on understanding the chemistry of both nutrient and contaminant elements in soils, with the goal of developing solutions to agricultural or environmental problems. Her research includes remediation of mildly contaminated soils (often call "brownfields") into soils suitable for productive use, such as community gardens. And understanding reaction products of fertilizers in soils to find ways to increase the fertilizer use efficiency.

Kansas State University

Presentation title: On-farm heat treatment of manure broadens the usage of manure beyond farm setting



Dr. Ilpo Polonen, is currently a Principal Research Scientist at HAMK (Häme University of Applied Sciences). Ilpo Polonen brings experience from previous roles at University of Applied Sciences, HAMK, Laurea University of Applied Sciences and Finnish Fur Breeders Association. Ilpo Polonen holds a Master of Agriculture and Forestry in Animal/Livestock from University of Helsinki. A Master in Agriculture and Animal Nutrition from Oregon State University and a PhD in Agriculture and Forestry from University of Helsinki.

Häme University

Thursday Sep 12 2024

Panel 3: Risk Assessment and Fertilizer Management

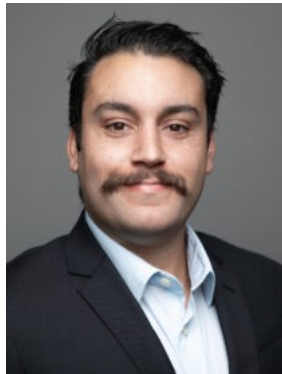
Presentation title: Changes in Agricultural Nutrient Balance of OECD Countries: Causes & Impacts



Prof. Pil Joo Kim holds a Bachelor, Master and PhD in Agricultural Chemistry from Chungnam National University. He is a professor at Gyeongsang National University, South Korea, Division of Applied Life Science. Dr. Kim has extensive experience in soil processes, including phosphorus cycling, carbon emissions, microbiology and biofertilizers.

Gyeongsang National University

Presentation title: Microbial risks and considerations for reusing waste streams: reclaimed wastewater and biosolids in agriculture



Dr. Hunter Quon research focuses on process-based modeling and quantitative approaches for improving water quality and understanding of implementing and using non-traditional water sources. Through such approaches he aims to improve public health around sustainable water use and guide policymakers and researchers towards better implementation strategies, intervention, and application of water source technologies. His main areas of interest are quantitative microbial risk assessment (QMRA), mechanistic and process-based environmental microbiology modeling, water source decision analysis, and data-driven case study assessments of water technology applications.

Arizona State University

Presentation title: Nitrogen-phosphorus ratios key aspect for waste derived fertilizers



Professor Rebecca Muenich grew up in the rapidly-urbanizing area where the local conflicts between urban growth, food production and environmental quality were at the forefront of local and national news. Influenced by these ongoing struggles she chose to direct her personal career path towards understanding how to address human-induced environmental problems.

Muenich is a watershed modeler focused on surface hydrology and water quality, especially in agricultural ecosystems. She focuses on evaluating the impact of land management decisions within the food-energy-water nexus.

University of Arkansas

Presentation title: A Life cycle perspective of fertilizers from valorized resources



Ximena joined Brunel University London in 2019 as Global Challenges Research Fellow working at the Institute of Energy Futures. Since then she has been develop international research collaborations in the fields of sustainable food systems. Outreach is key in Ximena's activities. Behavioral change and awareness are critical for taking Ximena's research out of the academia and generate real impact. Hence, she has been involved in several research led - outreach activities and initiatives; currently, the main projects are TakeaBiteCC- Take a Bite out of Climate Chage and GGDOT - Greenhouse Gas and Dietary choices Open Toolkit, transdisciplinary collaborations that aim to develop tools and engagement materials (e.g. games) to raise awareness about the relationship (impacts) between our food choices and climate change. TakeaBiteCC AT HOME, is the latest project, a response to COVID-19.

Brunel University London

Thursday Sep 12 2024

Panel 4: Mineral Nutrition, Soil Health, and Environmental Sustainability

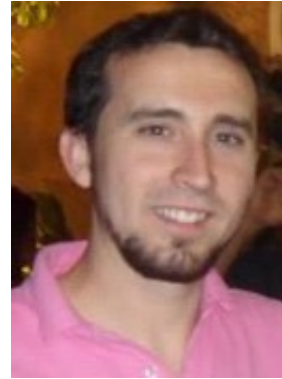
Presentation title: Phosphorus availability of dried swine sludge products



Dr. Stephanie Kulesza works with various manures and byproducts generated by animal ag industries to increase the efficiency and effectiveness of their use in the diverse cropping systems of North Carolina. Part of her extension role is to serve on two critical state of North Carolina committees: the Senate Bill 1217 Interagency Committee, which provides regulatory guidance for animal waste regulations, and the Interagency Nutrient Management Committee, which provides technical guidance. She is also responsible for teaching the annual Nutrient Management Training, which is a five-day course required to become a technical specialist certified in North Carolina to write nutrient management plans. Currently, Dr. Kulesza's research focuses on utilizing manure in various crops and crop rotations, identifying optimum application rates to maximize crop yield and quality while minimizing potential environmental impacts.

North Carolina State University

Presentation title: Improving the use efficiency of critical nutrients for agriculture and soil health in Mediterranean areas: inorganic and organic-based fertilizers.



Prof. Antonio R Sánchez Rodríguez is an Agricultural Engineer and Doctor from University of Córdoba (UCO). His research focuses on problem-solving in agriculture by developing sustainable fertilisation strategies based on the knowledge of plant-soil and soil-plant-entomopathogenic fungus relationships. Topics: soil fertility, calcareous soils, critical nutrients in agriculture (N, P, Zn, Fe), biobased P and N fertilisers, greenhouse gas emissions, NOx gases, abiotic N fixation.

Universidad de Córdoba

Presentation title: Navigating the Ripple Effects of Wastewater Irrigation on Soil Quality, Crop Health, and Environmental



Prof. Osnat Gillor investigates bacterial produced antibacterial peptides (bacteriocins) which are produced by all major lineages of Bacteria and Archaea. The Gillor lab has a broad set of research interests ranging from plants endophytes' role in metabolites production to the microbial aspects of soil dynamics in arid environments. We are particularly interested in understanding the role of perturbations like rain, irrigation, pollution, or mining on the soil microbial composition, structure, and function. What unites this disparate set of topics is the use of molecular methods to study the processes and patterns that control microbial interactions from the most complex habitat, the soil, to a simplified laboratory model system.

Ben Gurion University of the Negev

Presentation title: Effect of co-application of Trichoderma spp. with organic composts on plant growth enhancement, soil enzymes, and



Dr. Waleed Asghar joined the Kelly Craven's lab in July 2023 as a postdoc working on a new project evaluating how microbial activity and functions may influence, expedite, and maintain agroecosystems in Stillwater, Oklahoma. Waleed holds a Ph.D. in soil microbiology and ecology from the University of Yamanashi, Japan, and an MS in environmental science from Beijing Normal University, China. Waleed is interested in many areas of sustainable crop production and agricultural management, including how to improve soil health, how nutrients move through the soil, and how soil-plant microbial communities help wheat crops grow under different stress conditions.

Oklahoma State University