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Agriculture Technology 2018

Global Summit on

AGRICULTURE, FOOD SCIENCE AND TECHNOLOGY

October 26-27, 2018 | Boston, USA

Keynote Forum

Day 1

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Shrini K Upadhyaya

Univeristy of California Davis, USA

Plant water stress based precision irrigation using a wireless network of sensors and controllers

Precision irrigation–applying the right amount of water at the right place at the right time–has the potential to conserve our precious water resource without sacrificing yield or quality of the product. To implement precision irrigation sensors to indicate plant and soil water status are necessary. Plant physiologists suggest that plant water status (PWS) rather than the soil moisture content is a better indicator of irrigation requirements of orchard and vineyard crops since they have an extensive root system. PWS is often measured in terms of stem water potential using a pressure chamber, which is labor intensive and tedious to use and is not suitable for obtaining a large amount of data necessary to implement precision irrigation. To address this issue, our research group has developed and tested a continuous leaf monitoring system for use in orchard and vineyard crops. These leaf monitors along with soil moisture sensors, pressure sensors and latching solenoid valves were connected to nodes which formed a wireless network and deployed it in an almond orchard at Nickels Soil Laboratory in Arbuckle, CA. The sensor information was accessed remotely through PCs or mobile devices. Plant water stress based precision irrigation was conducted at this experimental site over the last three growing seasons. The results showed that variable rate irrigation management practice resulted in 70% of the water applied compared to ET demand and 85% of water applied compared to grower practice that used soil moisture sensors without any loss in yield or quality of the product.

Biography

Shrinivasa K Upadhyaya is a Professor, Department of Biological and Agricultural Engineering, University of California, Davis. He received his PhD in Agricultural Engineering from Cornell University in 1979. He spearheaded research in the area of soil-plant-machine interaction and precision agriculture. He has about 300 publications and holds seven patents. He has made several invited presentations and is a recipient of numerous awards, honors and recognition. He was inducted as the Fellow of ASABE in 2011 and received the prestigious John Deere Gold Medal for his contributions to the area of conservation of soil and water resources in 2013.

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Michael O Ezekwe

Alcorn State University, USA

Sustainable pasture-pork production system: A strategy for improving profitability, carcass and meat quality traits in finishing pigs

Today's swine industry has shifted from producing hog to producing pork, as producers are compensated for leaner pigs. A dependable and economical source of feed is the backbone of a profitable swine operation. Low income and rural swine producers are limited by today's high feed cost and are looking for a more sustainable pork production system. This study was to determine the effect of grazing systems on meat quality, carcass traits and on lipid metabolism gene expressions. Control pigs were fed 100% commercial diet. Fifty/fifty (50/50) group was placed on 50% of the diet consumed by the control group plus free access to ryegrass-clover pasture. The twenty-five/seventy-five/(25/75) group was fed 25% of the diet consumed by the control plus access to free pasture. The overall meat quality (flavor, overall acceptability and carcass traits (marbling, color) scored significantly higher ($P<0.0.5$) in the 25/75 group than in the control or 50/50 group. Back-fat was lower in 25/75 group ($P<0.05$) than in the control or 50/50 group. No differences were observed between the control and 50/50 in meat and carcass qualities. Real-time PCR revealed that peroxisome proliferator-activated receptor α (PPARα), peroxisome proliferator-activated receptor γ (PPARγ), lipoprotein lipase (LPL) and sterol-regulatory-element-binding protein 2 (SREBP-2) responded differently in muscle and adipose tissues. The results indicated that pasture-based pork production could upload lipid metabolism genes in muscle and adipose tissue important in reducing all production inputs, improving carcass traits and meat quality measures.

Biography

Michael O Ezekwe (PhD) is a professor of Animal Science and director of Swine Development Center at Alcorn State University. He received his PhD from Pennsylvania State University in animal nutrition. He has authored several papers in refereed journals and has two US Patent awards. He has conducted many technology transfer workshops in Africa and the Caribbean islands. Current research interest includes utilization of crops for animal and human nutrition.

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Notes:

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Foo Keng Yuen

Universiti Sains Malaysia, Malaysia

Wastewater reuse in a closed hydroponic system: An emerging solution for a sustainable agriculture

Today, agriculture remains the largest key driver of economic development, accounting for approximately 75% of the available freshwater resources. Increasing rainfall variability and extreme weather events have amplified the pressing pressure on alternative water resources, including rainwater, industrial recycled water and reclaimed wastewater, as a prominent way to meet with different water needs. It was estimated that greater than 700 million of consumers would depend primarily on the vegetables grown from these untreated or partially treated wastewater, while the health risks involved in the production chains have not been well defined. These polluting trace elements at the concentrations exceeding the physiological demand of food crops are expected to administer toxic effects to the plants but might be subjected to the bioaccumulation in food crops by entering into the food chains, to induce a large-scale dietary hazard in the major organs of the human body. In parallel to the urbanization and new city development, urban cultivation system, also known as a hydroponic system, is now seen as a viable solution to the limited land area suitable for agriculture and a more rational use of water resources, to provide better opportunities for a sustainable food supply in both developed and developing countries. It offers the ability to reuse water and nutrients, ease of environmental variability control, higher production yield and successive prevention of soil-borne diseases and pests. In this work, the application of nutrient film technique for selected food crop models cultivation under a controlled environment, for the investigation of different toxic heavy metal pollutants on the food crops quality and yield has been attempted. Priority attention has been focused into the feasibility of a hydroponic system for food crops cultivation, the impact of wastewater irrigation practice on the macroscopic symptoms, photosynthetic pigmentation, biochemical and physiological profiles, oxidative stress defense machinery of food crops, the accumulation and translocations of water pollutants and the associated health risks on different food crops species. This research presents a meaningful insight into the interruption of wastewater irrigation practice and its possible future health risk estimates for the reliable protection of human health and natural ecosystems and the building of a sustainable future.

Biography

Foo Keng Yuen is a lecturer and researcher of River Engineering and Urban Drainage Research Centre, Universiti Sains Malaysia. His research interests are environmental engineering, waste utilization, water treatment technology, catalysis, food security and toxicology and environmental health. He has a Web of Science Hirsch index of 35. He has authored more than 100 publications in reputed international, high-impact and proceeding journals and book chapters, with the total citations of exceeding 5,000 times. He serves as the Editor, Editorial Board Members, Scientific Adviser, Technical Committee, Review Committee, Keynote and Invited Speakers in several international scientific journals, conferences and research seminars.

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Yuegang Zuo
University of Massachusetts, USA

Bioavailability of natural phenolic antioxidants in fruits and other plant-derived foods

Phenolic compounds are constituents of many fruits, vegetables and other plant-derived foods and they have attracted a great deal of public and scientific interest because of their potential anticarcinogenic, antibacterial, anti-inflammatory and other health-promoting effects as antioxidants and free radical scavengers. A number of epidemiological studies have given evidence that consumption of fruits and vegetables is correlated with reduced incidence of mortality from cancer and cardiovascular and neurological diseases. The protection that fruits and vegetables provide against these diseases has been attributed to the polyphenolic and other antioxidant phytonutrients contained in these foods. Therefore, it is important to isolate, identify and quantify polyphenolic compounds and their bioavailability in order to understand their critical roles in human health. In this presentation, the speaker will first report on the progress on the separation, identification and measurement of polyphenols in various fruits, vegetables, traditional Chinese medicines, tea and other plant-derived foods in the past decade, mainly by GC, GC-MS, HPLC, HPLC-MS, CE and CE-MS; then further discuss the antioxidant, free-radical scavenger and anticancer capacity of polyphenols and finally focus on the bioavailability including absorption, subsequent distribution, metabolism and excretion of polyphenols in human fluids.

Biography

Yuegang Zuo is currently a Full Professor in analytical, environmental and food chemistry and Director of Graduate Programs at Department of Chemistry and Biochemistry, University of Massachusetts Dartmouth. He received his BS degree in chemistry from Wuhan University in 1982, his MS degree in environmental chemistry from the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, in 1984 and his PhD in environmental science from Swiss Federal Institute of Technology Zurich in 1992. Most of his recent research has focused on separation, identification and quantification of endocrine disrupting pollutants and phenolic antioxidants in plants and seafood as well as in the related environments and examine their occurrence, sources, distribution, transportation and fate in the bio-chemosphere. He has published over 80 peer-reviewed papers in prestigious international scientific journals such as Science, ES&T and JAFS.

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A Jagadeesh

Nayudamma Centre for Development Alternatives, India

Natural cool drinks from plants

There is a growing interest in natural cool drinks from plant derivatives. There is *Annona squamosa* (Custard Apple) the pulp in the fruit is rich in vitamin C and has sugars. A natural soft drink can be made from the pulp of custard apple. Also traditionally in India during a religious festival in summer a soft drink from jaggery with spices is served. A formula for jaggery powder with spices in the form of the sachet (packed) is found, also buttermilk powder sachets. All the material is available locally. The manufacture of the natural soft drink sachets will provide employment and boon in developing countries and has export value. The analysis of the soft drink contents presented.

Biography

A Jagadeesh obtained his bachelors and masters degrees in Physics from Sri Venkateswara University, Tirupati, Andhra Pradesh, India and his Doctorate degree in Wind Energy from the prestigious University of Roorkee {now the Indian Institute of Technology Roorkee (IITR)}. He has been involved in teaching and research for the last 30 years. He founded "Society of Science for the People" in 1973, an NGO which has been acting to formulate innovative science and technology programs and projects. He widely interacts with several global and national organizations in Science and Technology projects. He also founded "Nayudamma Centre for Development Alternatives" in Nellore, Andhra Pradesh, India in 1994 which has been acting as a think tank in promoting Energy, Environment and Appropriate Technology programs and projects. He has been a Resource person to several organizations connected with Sustainable Development in India and abroad. He has held many important positions such as Director, Murugappa Chettiar Research Centre, Chennai, India; Vice President, Subhash Projects and Marketing Ltd, Bangalore, India; Director, Infrastructure Consulting and Engineers Pvt. Ltd, Bangalore and former Professor and Head, Centre for Energy and Sustainable Resources, RMK Engineering College, Kavaraipettai, Tamil Nadu, India.

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Jonathan Hamp Adams

Grundfos, USA

More crop per drop

Due to the increase in world population, estimates indicate that food production must increase by 50% by 2030 and by 100% by 2050. As water becomes increasingly scarce due to groundwater and surface water overexploitation, agriculture will need to invest in new productivity and efficiency measures with mechanized irrigation that will enable yield increases of 100-400%. Farming has moved away from being a "craft" to being a science. The adoption phase of technology and in recent years, digitalization has taken a long time. However, with increasing demand for food, decreasing availability of water, lower hardware prices and rising labor costs, more and more farmers are adopting new innovations and technologies. This paper considers technologies available for "Smart Irrigation" collected from Grundfos's global data and knowledge bases with more than 70 years of experience in the supply of pumping technology to the agricultural industry. It references active global innovation projects from the Americas to Europe and Africa.

Biography

Jonathan Hamp Adams has been involved in the water industry since 1994. In addition to his first-rate BSc, he is the holder of the MDP gold medal from the University of South Africa, SBL and has an MBA from Henley Business School (UK). Early in his career, he managed an agriculture irrigation and equipment engineering supply house in South Africa. In 2008, he joined Grundfos as the General Manager and later Area Managing Director for sub-Saharan Africa, where he was involved in many major private and public water projects across the continent. During his time in Africa, he was involved in pioneering the annual Grundfos MegaFarmer Forum, which brought leading Farmers and Industry stakeholders (private and public) on the continent together to discuss the use of energy and water in agriculture. He relocated to the USA in 2015 along with his wife Robyn and two children, Nicholas and Sarah. He is currently the President of Grundfos USA, Grundfos's single largest global sales organization, with sales exceeding $550m annually.

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Shirin Ghatrehsamani

University of Florida, USA

Application of computational fluid dynamics to optimize thermotherapy system for treating citrus greening

The citrus industry in Florida and several other citrus-producing areas in Brazil and China are suffering from the citrus greening disease (known as HLB) and there is no known cure. HLB-infected trees have low production, low fruit quality and could die within about three to four years. This disease has been a fatal disease for the citrus industry in Florida since 2005. Heat treatment (Thermotherapy) is one of the non-chemical methods and it is based on the idea that heating a plant at a specific temperature and for a pre-determined time can kill pathogen microorganisms while minimizing host devastation. In this study, the heat treatment system has been developed for sustaining the productivity of HLB-infected trees. Using steam to treat HLB-infected citrus trees under field conditions requires an enclosure to cover the tree canopy and hold the steam for a certain amount of time. We evaluate a mobile heat thermotherapy system for the appropriate temperature and time combination. The heat distribution inside the canopy cover was monitored and simulated by a mathematical model and computational fluid dynamic (CFD) method to develop and improve the supplementary heat thermotherapy system to generate a uniform temperature. The theoretical predictions are in good agreement with the experimental measurements, which can possibly be described/predicted satisfactorily by the model developed in the present study.

Biography

Shirin Ghatrehsamani is currently a doctoral candidate at the University of Florida, her doctoral dissertation is focused on the needs of Florida's citrus industry due to the spread of the citrus greening disease (HLB) that has sparked concern for the continuity of the citrus industry in Florida. She has developed an integrated model to simulate and analyze heat distribution throughout the tree canopy and improve a supplementary heat thermotherapy system to generate a uniform temperature and treat HLB-infected trees. She has helped to develop a smart automated smart thermotherapy system for this purpose.

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