INNOVATION AND TECHNOLOGIES IN AGRICULTURAL NUTRIENT MANAGEMENT: SENSING TECHNIQUES AT FIELD-SCALE

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Efficient crop water and nutrient management is vital for sustainable agriculture. However, this requires adequate tools to measure soil and plant nutrient status. Without these tools, crop production might be reduced, and surrounding freshwater systems could be compromised. Additionally, in situ nutrient assessment and real time monitoring has been a challenge for researchers because of the spatiotemporal variability of nutrient movement in soils. Multiple sensing technologies have been implemented in agricultural systems to a163ddress this issue, including in-field techniques, Unmanned Aerial Vehicles (UAVs), and remote sensing techniques using satellite-based imagery. These technologies can be applicable at both, field, and watershed levels. Additionally, multiple in-ground sensors such as biosensors, on-the-go spectroscopy, and Volumetric Ion Content methods have been developed to provide in-situ insights into soil nutrient status. However, these technologies still have accuracy and spatial variability limitations, as well as temporal constraints that hinder their effectiveness in long-term soil nutrient status assessment. In this study, we conducted an exploratory review of sensing techniques used in agricultural nutrient management, with a primary focus on field scale applications. Multiple features including sensor direct and indirect measurements, time scale and other assumptions used, calibration process, accuracy, and the output provided in relation to practicality for the decision maker were used to assess the efficiency of these systems and to explore avenues for sensor improvement. The results from this review will provide valuable insights for stakeholders in Florida interested in field-based agricultural nutrient management and the adoption of sensing technologies.

PRESENTER BIO: Daniel Palacios is a master student in the agricultural and biological department at the University of Florida with experience in the industry and research fields, has been part of the design and implementation of irrigation projects and has helped in the development of research projects related to the use of sensing technologies for water management. His master research program is part of the Science and Technologies for Phosphorous Sustainability (STEPS) NSF Science and Technology Center.