UF IFAS
UNIVERSITY of FLORIDA

Department of Soil, Water, and Ecosystem Sciences

21st Research Forum

February 10, 2025

J. Wayne Reitz Union Rion Ballroom

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Welcome

About SWES

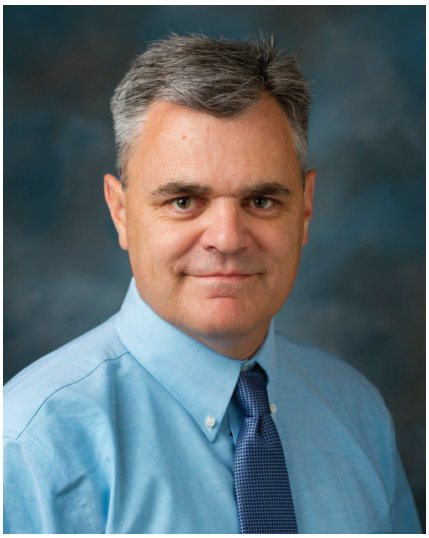
The UF/IFAS Department of Soil, Water, and Ecosystem Sciences (SWES) faculty are located both on the main campus in Gainesville and at many off-campus Research and Education Centers. The mission of the department is to conduct basic and applied research on soil, water, and ecosystem related problems associated with sustaining agriculture and protecting natural resources. Our faculty and students conduct research and teach on a wide range of ecosystems including: agricultural lands, urban lands, rangelands, forested lands, and wetlands and aquatic ecosystems, with emphasis on plant productivity, water quality, carbon sequestration, and greenhouse gas emissions. Research efforts are organized into the following thrust areas:

- Environmental risk assessment and mitigation
- Landscape/watershed sciences and modeling
- Soil sciences (chemistry, fertility, health, management, microbiology, pedology, physics)
- Sustainable ecosystem services & management technologies (agricultural, natural, urban systems)
- Water quality (nutrients, pesticides, emerging contaminants, microbiology)
- Wetland, aquatic, and coastal systems ecology

Cover image generated with DALL-E and Adobe Firefly

Introduction

A Message from:



Dr. P. Chris Wilson

Interim Chair & Professor

Department of Soil, Water, & Ecosystem Sciences

UF/IFAS

Welcome to the 21st Soil, Water, and Ecosystem Sciences Research Forum sponsored by the Department of Soil, Water, and Ecosystem Sciences (SWES), IFAS, UF Water Institute, and the University of Florida. This Forum is designed to bring together representatives from state and federal agencies as well as private industry, faculty, graduate students, and prospective students. The Forum provides an opportunity for all those interested in soil, water, and ecosystem sciences to interact with our students, faculty, and administrators on campus. The keynote speaker for this year's Forum is Dr. Alina Zare, Professor, Department of Electrical and Computer Engineering at the University of Florida. Her presentation is entitled "Advancing Foundational AI Research and Applications through Transdisciplinary Collaboration." Dr. Zare's biographical sketch is posted in this brochure.

Research conducted by graduate students, visiting scholars, and post-doctoral fellows is the core of our SWES research programs. At present, 168 graduate students (including 74 PhD and 94 MS students), 96 undergraduates (15 SWES and 81 IS - EMANR), several visiting scholars, and post-doctoral associates support current research activities in the department. For this year's Forum, we offer you select examples of the research conducted by three faculty members. Student presentations include 5 oral papers and 36 poster presentations. In addition, we have 12 posters from postdoctoral research associates, visiting scholars, and scientific staff. For those of you interested in our programs, please contact me or any one of our faculty members.

Thanks to the Faculty Research Forum Committee, chaired by Dr. Patrick Inglett, for coordinating activities related to the Forum. Thanks to Robert Daffron, Kyle Davis, Mike Loizzo, Jessica McGarrah, Ashiana Ndandou, Joanna Shelnut, Michael Sisk, and the SWES Graduate Student Association for planning the Forum. Finally, I want to express my appreciation to all students, post-doctoral fellows, staff, visiting scholars, and faculty for their active participation in the Forum. The assistance of judges in selecting best oral/poster presentations is greatly appreciated.

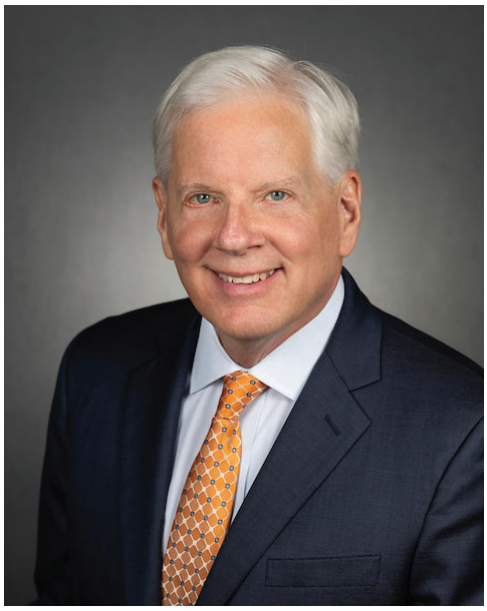
Opening Remarks

Dr. J. Scott Angle

Senior Vice President
Agriculture & Natural Resources

Institute of Food & Agricultural Sciences

University of Florida



Dr. J. Scott Angle is a national leader in developing and disseminating the science that supports food production and management of natural resources.

As chief executive of the agriculture and environmental sciences arm of a leading land-grant university, he champions public science as a path to improve lives and reduce human suffering. His accomplished career in government, nonprofit international development, and academia informs an approach to leadership based on service, partnership, and drive for impact.

An innovator who holds seven patents, Dr. Angle has successfully guided multiple organizations through budget shortfalls and other challenges. Dr. Angle leads nearly 2,300 employees who work in all 67 Florida counties. UF/IFAS encompasses the College of Agricultural and Life Sciences, the Florida Cooperative Extension Service, and the Florida Agricultural Experiment Station.

Before joining UF/IFAS in July 2020, Dr. Angle led the United States Department of Agriculture's National Institute of Food and Agriculture (NIFA). Prior to his national service, he led the non-profit International Fertilizer Development Center (IFDC), where he oversaw a staff of more than 800 and coordinated development projects worldwide. From 2005 to 2015, he served as dean of the College of Agricultural and Environmental Sciences at the University of Georgia. During his tenure, the college's enrollment grew 30 percent.

Dr. Angle worked as professor of soil science at the University of Maryland and later as director of the Maryland Agricultural Experiment Station and Maryland Cooperative Extension. He is widely cited for his scholarship on phytoremediation, the use of plants for extraction of heavy metals from soil.

Dr. Angle received his B.S. in agronomy and M.S. in soil science at the University of Maryland. He earned his Ph.D. from the University of Missouri with an emphasis on soil microbiology. Dr. Angle is a fellow of the American Association for the Advancement of Science and was inducted as a member of the Academy of Science, Engineering & Medicine of Florida in November 2024.

Dr. Angle served as UF's provost for 14 months and returned to UF/IFAS in September 2024. His "tenure home" is in the Department of Soil, Water, and Ecosystem Sciences.

Keynote Speaker

Dr. Alina Zare

Professor

Electrical and Computer Engineering Department, University of Florida

Director

Artificial Intelligence and Informatics Institute, University of Florida

Dr. Alina Zare teaches and conducts research in machine learning and artificial intelligence as a Professor in the Electrical and Computer Engineering Department at the University of Florida. She also serves as the Director of the Artificial Intelligence and Informatics Institute at the University of Florida. Dr. Zare's research has focused primarily on developing new machine learning algorithms to automatically understand and process data and imagery. Her research has included automated plant root phenotyping, sub-pixel hyperspectral image analysis, target detection and underwater scene understanding using synthetic aperture sonar, LIDAR data analysis, Ground Penetrating Radar analysis, and buried landmine and explosive hazard detection.

Keynote Abstract:

Advancing Foundational AI Research and Applications through Transdisciplinary Collaboration

Machine learning and artificial intelligence (AI) have recently had tremendous impact across our personal and professional lives. However, much of the recent advances are focused on a small set of problem types – those that mimic some human activities and those in which we have enormous amounts of data. However, many applications do not always fit neatly into the assumed framework and problem types for standard machine learning and AI methods. For example, we may have data coming from non-visual sensor systems bringing with them unique challenges related to the underlying sensing phenomenology and application-based constraints. In order to develop machine learning and AI algorithms best suited to the applications at hand, transdisciplinary research and, subsequently, the development of approaches with underlying assumptions that match the application are required. During this talk, I will give an overview of our efforts in transdisciplinary research, outline the need for merging disciplines, and discuss approaches that learn from the uncertain, imprecise data we expect to see.

Program

Opening Session: Welcome & Keynote Speaker
J. Wayne Reitz Union, Rion Ballroom

8:15 am – 9:00 am	**REGISTRATION**
9:10 am – 9:20 am	**Welcome** **Dr. P. Chris Wilson** Interim Chair and Professor Department of Soil, Water, and Ecosystem Sciences University of Florida
9:20 am – 9:30 am	**Opening Remarks** **Dr. J. Scott Angle** Senior Vice President Agriculture and Natural Resources Institute of Food and Agricultural Sciences University of Florida
9:30 am – 10:30 am	**Keynote Speaker** **Dr. Alina Zare** Professor, Electrical and Computer Engineering Department Herbert Wertheim College of Engineering Director, Artificial Intelligence and Informatics Institute University of Florida **Presents: *Advancing Foundational AI Research and Applications through Transdisciplinary Collaboration***
10:30 am – 10:50 am	**BREAK**

Program

Session I: Featured Faculty Oral Presentations
J. Wayne Reitz Union, Rion Ballroom

10:50 am – 11:50 am

Featured Faculty Oral Presentations
Session Chair: Dr. Patrick Inglett

10:50 am – 11:10 am

Use of Artificial Intelligence in Soil Nutrient Management and Potato Harvesting
Dr. Lakesh Sharma, Assistant Professor
Soil Fertility and Sustainable Nutrient Management
Department of Soil, Water, and Ecosystem Sciences
University of Florida

11:10 am – 11:30 am

Leveraging AI for Quantifying Soil Hydrology: Applications in Agriculture and Climate Change Mitigation
Dr. Ebrahim Babaeian, Assistant Professor
Soil Physics
Department of Soil, Water, and Ecosystem Sciences
University of Florida

11:30 am – 11:50 am

Bridging the Gaps: Foundation Models and Conversational AI for Scalable Agro-Environmental Monitoring
Dr. Nikolaos Tziolas, Assistant Professor
Soil Science Artificial Intelligence
Department of Soil, Water, and Ecosystem Sciences
Southwest Florida Research and Education Center
University of Florida

11:50 pm – 1:00 pm

LUNCH ON YOUR OWN

Program

Session II: Ph.D. Student Oral Presentations
J. Wayne Reitz Union, Rion Ballroom

1:00 pm – 2:15 pm	**Ph.D. Graduate Student Oral Presentations** **Session Chairs: Ryan Champiny, Yaslin Gonzalez, Suraj Melkani, Taryn Chaya, Jenna Reimer, Kendall Mackin, Perse Mungofa, Karun Katoch, and Justina Dacey**
1:00 pm – 1:15 pm	***Effect of Reclaimed Water on Blueberry Seedling Growth and Root Morphology*** **Yasmeen Saleem**, Shinsuke Agehara, and Davie M. Kadyampakeni
1:15 pm – 1:30 pm	***Evaluating Cover Crop Effects in Tree Crop Systems Using Traditional and Novel Soil Health Indicators*** **Yaslin Gonzalez**, Sarah Strauss, Marcio Nunes, Zane Grabau, Allan Bacon, and Gabriel Maltais-Landry
1:30 pm – 1:45 pm	***Effects of Shifting Salinity on Nitrogen Transformations in an Urbanizing Subtropical Estuary*** **Jenna Reimer**, AJ Reisinger, and Ashley Smyth
1:45 pm – 2:00 pm	***Sugarcane and Flooded Rice Crop Rotation to Address Soil Loss and Environmental Quality in the Everglades Agricultural Area*** **Xue Bai,** Donghyeon Kim, Young Gu Her, Samuel J. Smidt, Yuncong Li, Donald Meals, and Jehangir H. Bhadha
2:00 pm – 2:15 pm	***Is Nectar a Sweet Poison? A Tale about Pesticide Management, Nectar, and Pollinators*** **Vanesa Rostan**, Mia Cabrera, Sandra B. Wilson, and P. Chris Wilson

Program

Session III: Student Poster Viewing and Reception
J. Wayne Reitz Union, Rion Ballroom

3:00 – 4:00 pm	**Poster Session I** Judging of Even Numbered Posters During This Period
4:00 – 5:00 pm	**Poster Session II** Judging of Odd Numbered Posters During This Period

Help Minimize Waste at this Event

The Department of Soil, Water, and Ecosystem Sciences is committed to improving the health of our soils by composting all biodegradable materials from this year's Research Forum, including coffee grounds, food waste, and shredded paper. All compost-friendly waste will be processed by the Compost Cooperative and Gardens, creating an organic soil amendment to feed the future. Be sure to use the appropriate composting and recycling containers during the event.

Co-Sponsor

Thank you to our co-sponsor of the 21st Soil, Water, and Ecosystem Sciences Research Forum for funding the keynote presentation live stream:

UF | Water Institute
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Judged Posters

Titles & Authors

1. *Assessing the effects of varying rates of irrigation and potassium fertilization on the growth of Dendrocalamus asper bamboo in Florida*
   Labake Agunbiade, Marcio R. Nunes, and Davie M. Kadyampakeni

2. *Sustainable Intensification with Winter Crops Improves Nitrogen Cycling but Not Yields in Southeastern US Corn Systems*
   Julia Barra Netto-Ferreira, Chris H. Wilson, and Gabriel Maltais-Landry

3. *Evaluating the Impact of Biostimulants on Young Sweet Orange Trees Grafted onto Different Rootstocks*
   Noor Ul Basar, Muhammad Adnan Shahid, and Davie M. Kadyampakeni

4. *Evaluating Best Management Practices for Nitrate Reduction in the Floridan Surficial Aquifer*
   Seyed Mostafa Biazar, Golmar Golmohammadi, and Amartya Saha

5. *The Use of Phosphorus Starter Fertilizer in Field Corn Production*
   Jay Capasso, Kelly Morgan, Vimala Nair, Jehangir Bhadha, Vivek Sharma, Lilit Vardanyan, and Kevin Athrearn

6. *Carbon Accounting and Cation Transport for Enhanced Weathering of Olivine and Recycled Concrete Fines*
   Ryan E. Champiny, Ebrahim Babaeian, and Yang Lin

7. *Analyzing the heavy metal accumulation potential of Sagittaria lancifolia from a constructed wetland*
   Zaed Christie and Masanori Fujimoto

8. *Long Term Nutrient Accretion Rates in the Everglades Storm Water Treatment Areas (STAs)*
   Ankita Datta, Praveen Subedi, and Patrick Inglett

9. *Short- and Long-Term Effects of Humic Acid Amendments on the Citrus Rhizosphere Microbiome*
   Emma Dawson, Ute Albrecht, and Sarah L. Strauss

10. *AI-Driven Downscaling of SMAP Soil Moisture Data Using Google Earth Engine: A Pre- and Post-Hurricane Milton Assessment*
    Nikhil Raj Deep and Ebrahim Babaeian

11. *Federated Learning: Decentralizing Soil Modeling for Global Collaboration and Enhanced Data Privacy*
    Giannis Gallios, Nikolaos Tsakiridis, and Nikolaos Tziolas

Judged Posters

Titles & Authors

12. *Variable rate fertilization of phosphorus in young Dendrocalamus asper bamboo in Florida*
Cyrus J. Januarie, Lakesh Sharma, Joao Vendramini, and Davie M. Kadyampakeni

13. *Optimizing Molybdenum Fertilization for Young HLB-Affected Citrus Trees*
Kondwani Kamsikiri, and Davie M. Kadyampakeni

14. *Soil Science Education: A Framework for Managing and Utilizing Soil Pits in Instruction*
Katya Kasprzak and Ann C. Wilkie

15. *GaiaBot: Simplifying Access to Soil Data*
Anastasia Kritharoula and Nikolaos Tziolas

16. *The Effect of Mixed Microplastic on Freshwater Microalgae Growth and Survival*
Xiaozheng (Harry) Liu and Masanori Fujimoto

17. *Optimizing a soil enzyme activity assay as a biological soil health indicator for sandy Florida soils*
Kendall Mackin and Gabriel Maltais-Landry

18. *Aligning farmers' perceptions of soil productivity with soil health test results in Florida pastures*
Swarnali Mahmood, Jose Dubeux, and Yang Lin

19. *Decoding the Speciation of Legacy Phosphorus in Acidic, Organic, and Calcareous Soils Using Hedley Fractionation, Total Soil Phosphorus Storage Capacity, Solution ^{31}P Nuclear Magnetic Resonance, and X-ray Absorption Near Edge Spectrometry*
MD Anik Mahmud, Caroline Buchanan Fisher, Xue Bai, Abul Rabbany, Shin-Ah Lee, Rebecca Muenich, Luke Gatiboni, Owen Duckworth, Juan Claudio Nino, Andy Ogram, Jonathan Judy, and Jehangir H. Bhadha

20. *Examining Carbon Farming Practices to Address Soil Sustainability in the Everglades Agricultural Area, South Florida*
Noel Manirakiza, Suraj Melkani, Xue Bai, Yang Lin, Abul Rabbany, Allan Bacon, Michael Andreu, and Jehangir H. Bhadha

21. *Investigating patterns and drivers of soil organic carbon stability in cultivated Histosols of South Florida using data-driven machine learning and simulation modeling*
Suraj Melkani, Noel Manirakiza, *Abul Rabbany,* Sabine Grunwald, *Aditya Singh,* Ziwen Yu, and Jehangir H. Bhadha

22. *Deep learning and generative artificial intelligence techniques for image-based analysis of soil properties in the surface and subsurface horizons*
Perseveranca Mungofa, Sabine Grunwald, Stephan Mantel, Giulio Genova, Laura Waldo, and Arnold Schumann

Judged Posters

Titles & Authors

23. *Advanced Deep Learning Models for Predicting Surface Water Discharge and Groundwater Levels in Florida*
Rohith Reddy Nedhunuri, Golmar Golmohammadi, and Seyed Mostafa Biazar

24. *Eff ect of Slow-Release Nitrogen Fertilizer and Biochar on Soil Properties and Maize (Zea Mays L), Agronomic Performance, and Nutrient Use Effi ciency*
Oluwasegun J. Olubisi, I.O. Udemba, A.C.O. Uthman, K.S. Are, and A.O. Ojo

25. *Optimizing Nitrogen and Phosphorus Management for HLB-Aff ected Sweet Orange*
Monika Peddapuli, Alisheikh Atta, and Davie M. Kadyampakeni

26. *Relationships Between Land Management Practices and Soil Health on Eleven Dairy Farms*
Audrey Plauche, Swarnali Mahmood, and Yang Lin

27. *Exploring the Potential of Silicon Nanoparticles to Mitigate Water Stress in Citrus*
Jose Prieto and Davie M. Kadyampakeni

28. *High-Resolution Soil Moisture Mapping in Florida: A Hybrid CNN – LSTM Fusion of SMAP, Soil Physical and Remote Sensing Data*
Saman Rabiei, Ebrahim Babaeian and Sabine Grunwald

29. *Changes in Soil Microbial Diversity and Community Composition Across a Pine Invasion Gradient*
Benjamin Reimer, Kaile Zhang, Ko-Hsuan Chen, Corinne Vietorisz, Jennifer Bhatnagar, Rytas Vilgalys, Jason Hoeksema, Jonathan Plett, Ian Anderson, Jeff Powell, Alejandro Rojas, and Hui-ling Liao

30. *The Influence of Soil pH on Citrus Root Morphology and Nutrient Uptake Effi ciency*
Duplicate Sambani, Tripti Vashisth, Diane B. Bright, and Davie M. Kadyampakeni

31. *Integrated Hydrological and Water Quality Modeling of the Peace River Watershed Using SWAT+*
Saba Shaghaghi and Golmar Golmohammadi

32. *Trends of Phosphorus Storage in Well- vs Under-Performing Everglades Stormwater Treatment Wetlands*
Zoe A. Spielman, Patrick W. Inglett and Praveen Subedi

33. *Impacts of Nutrient Ratios of Calcium and Zinc on Citrus Growth and Root Development*
Therese Thompson and Davie M. Kadyampakeni

34. *Solubilization of Soil Legacy Phosphorus using Metal Chelating Agents*
Md Shakil Uddin, MD Anik Mahmud, Abul Rabbany, Julien Beuzelin, Jonathan Judy, and Jehangir H. Bhadha

Judged Posters

Titles & Authors

35. *Pest Control in Full Bloom: Marigolds in Mulch*
Rebecca Walters and Ann C. Wilkie

36. *Treatment Technologies for Phosphorus Mitigation: A Conceptual Framework*
Berson J. Valcin, Yicheng Yang, Suraj Melkani, and Jehangir H. Bhadha

Non-Judged Posters

Titles & Authors

37. *Soil Phosphorus Storage Capacity and Soil Test Parameters for Sustainable Fertilizer Management*
Priyanka Chandra, Lilit Vardanyan, and Vimala D. Nair

38. *Poultry Litter Biochar as an Environment-Friendly Alternative to Inorganic Phosphorus Fertilizer*
Andressa M. Freitas, Vimala. D. Nair, Lynn E. Sollenberger, Willie. G. Harris, and Amanda N. Rodriguez

39. *Phosphorus Immobilization Technologies for Remediating Biosolids-Impacted Soils in the St. Johns River Basin*
Andressa M. Freitas, Vimala D. Nair, Lilit Vardanyan, and Todd Z. Osborne

40. *Soil Microbial Responses to Cover Cropping across Tropical Agroecosystems*
Tanjila Jesmin, Noel Manirakiza, Jay Capasso, Kevin Korus, Hardeep Singh, Zachary Brym, and Jehangir H. Bhadha

41. *Site-specific Plant Phosphorus Bioavailability in a Mehlich 3-P Extract*
Amanda N. Rodriguez, **Vimala D. Nair**, Andressa M. Freitas, Gabriel Maltais-Landry, and Lynn E. Sollenberger

42. *The impact of using organo-mineral fertilizers on soil health indicators and agricultural productivity*
Dieini Melissa Teles dos Santos, Julia Barra Neto Ferreira, Ana Karina dos Santos Oliveira, Angelique Bochnak, Kendall Mackin, Allison Schmidt, Luane Lima Souza, Everaldo Zonta, and Gabriel Maltais-Landry

Non-Judged Posters

Titles & Authors

43. *Improving phosphorus use efficiency with biofertilizers*
Flávia Santos, Md Shakil Uddin, Tanjila Jesmin, Md Anik Mahmud, Christiane Paiva, Luke Gatiboni, Jonathan Judy, Marcio Nunes, Julien Beuzelin, Glauco Teixeira, Lesley Schumacher, Abul Rabbany, Leonardus Vergutz, Hudson Carvalho, and Jehangir H. Bhadha

44. *Changes in Soil Phosphorus Over Fifteen Years in Taylor Slough, Everglades National Park*
Tracey Schafer, Paul Julian, Donatto Surratt, and Todd Z. Osborne

45. *Phosphorus Sorption and Retention in Florida Soils: Insights for Improved Fertilizer Management*
Lilit Vardanyan, Vimala D. Nair, and Andressa M. Freitas

46. *Inorganic nitrogen and organic matter jointly regulate ectomycorrhizal fungi-mediated iron acquisition*
Haihua Wang, Kaile Zhang, and Hui-Ling Liao

47. *Responsible Design, Development and Deployment of Phosphorus Treatment Technologies*
Yicheng Yang, Berson Valcin, Olga Borquez, Alison Deviney, Khara Grieger, Matthew Scholz, Elise Morrison, Jacob Jones, and Jehangir H. Bhadha

48. *Impact of Soil Moisture Levels on Redox Potential and Microbial Organic Carbon Degradation in a Tropical Peat Soil*
Nina C. Infantado, Sarah Strauss, and Willm Martens-Habbena

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