Spring 2025 Graduate Research Symposium

February 15, 2025

Morning Sessions - 8 AM to 12 PM

Networking Lunch and Speaker - 12 PM - 1 PM

Afternoon Sessions - 1 PM to 4 PM

Old Main Academic Center

Poster Presentations - 1st Floor Lobby

Oral Presentations - 1st and 2nd Floor Classrooms

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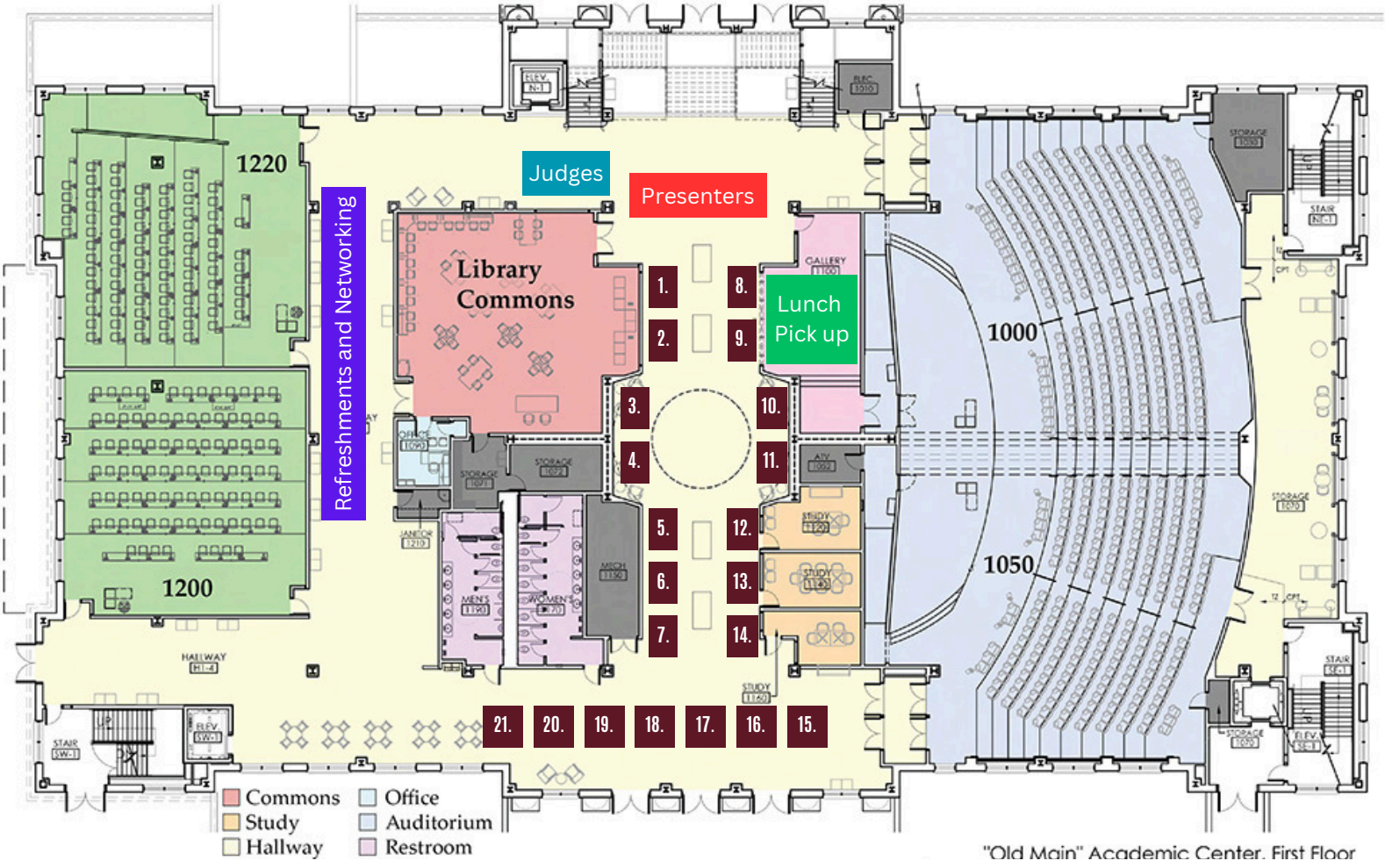
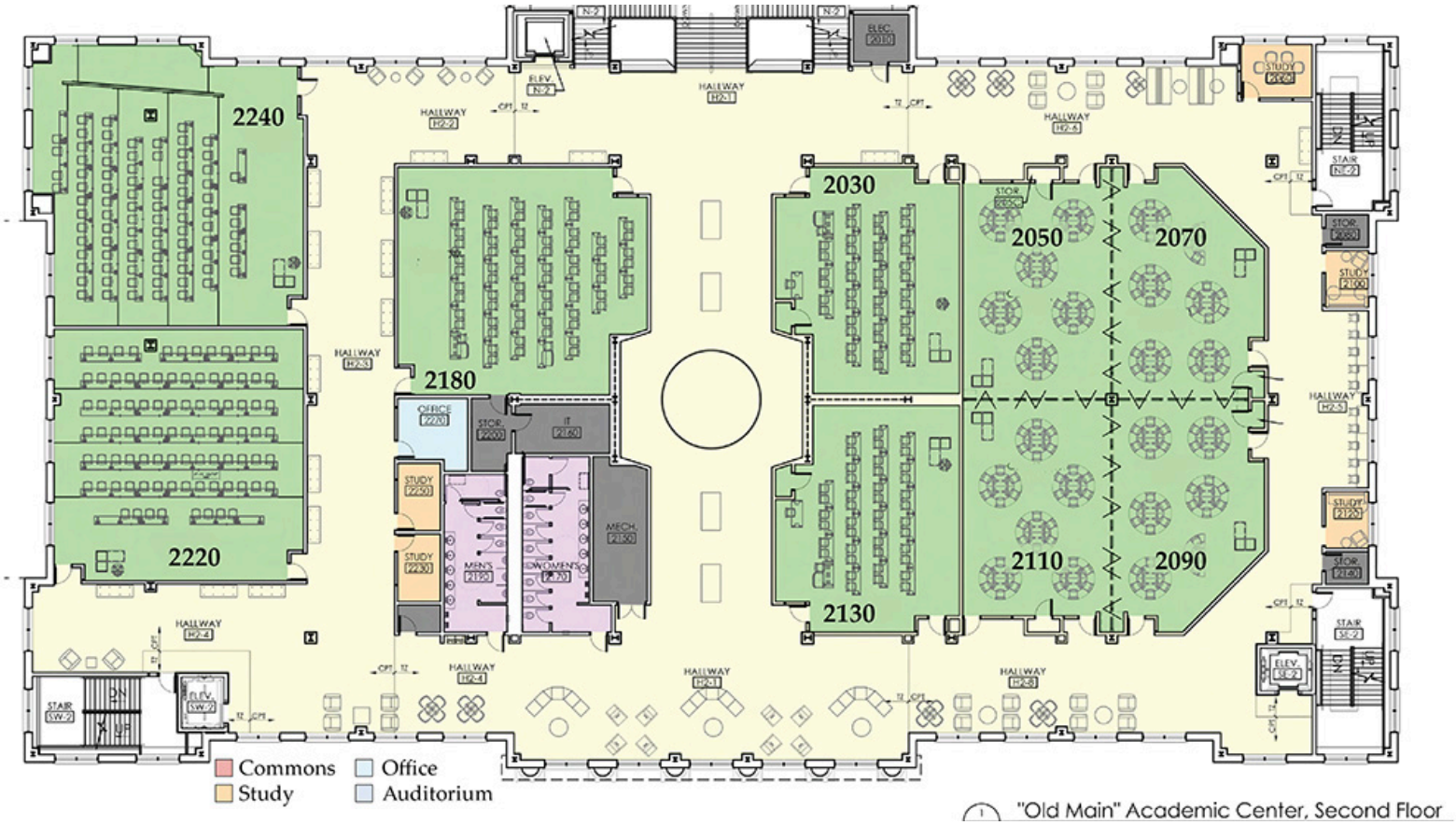


Presenters Oral and Poster Presenter Check-in

Judges Judges and Moderator Check-in

Lunch Pick up Lunch for participants and judges will be ready for pick up at 12 noon

Refreshments and Networking Space to network and enjoy refreshments between sessions



Session Schedule Outline

Session	Session Code	Location	Time	Sign in Time
AM Poster 1	MP1	1st Floor Lobby	8 AM – 9:45 AM	7:45 AM
AM Poster 2	MP2	1st Floor Lobby	8 AM – 9:45 AM	7:45 AM
AM Poster 3	MP3	1st Floor Lobby	8 AM – 9:45 AM	7:45 AM
AM Poster 4	MP4	1st Floor Lobby	10:00 AM – 11:45 AM	9:45 AM
AM Poster 5	MP5	1st Floor Lobby	10:00 AM – 11:45 AM	9:45 AM
AM Poster 6	MP6	1st Floor Lobby	10:00 AM – 11:45 AM	9:45 AM
AM Oral 1	MO1	Room 1220	8 AM – 9:30 AM	7:45 AM
AM Oral 2	MO2	Room 1200	8 AM – 9:30 AM	7:45 AM
AM Oral 3	MO3	Room 2180	8 AM – 9:30 AM	7:45 AM
AM Oral 4	MO4	Room 2240	8 AM – 9:30 AM	7:45 AM
AM Oral 5	MO5	Room 2130	8 AM – 9:30 AM	7:45 AM
AM Oral 6	MO6	Room 1220	10 AM – 11:30 AM	9:45 AM
AM Oral 7	MO7	Room 1200	10 AM – 11:30 AM	9:45 AM
AM Oral 8	MO8	Room 2180	10 AM – 11:45 AM	9:45 AM
AM Oral 9	MO9	Room 2240	10 AM – 11:30 AM	9:45 AM
AM Oral 10	MO10	Room 2130	10 AM – 11:45 AM	9:45 AM
PM Poster 1	AP1	1st Floor Lobby	1:00 PM – 2:20 PM	12:45 PM
PM Poster 2	AP2	1st Floor Lobby	1:00 PM – 2:20 PM	12:45 PM
PM Poster 3	AP3	1st Floor Lobby	1:00 PM – 2:20 PM	12:45 PM
PM Poster 4	AP4	1st Floor Lobby	2:30 PM – 4:00 PM	2:15 PM
PM Poster 5	AP5	1st Floor Lobby	2:30 PM – 4:00 PM	2:15 PM
PM Poster 6	AP6	1st Floor Lobby	2:30 PM – 4:00 PM	2:15 PM
PM Oral 1	AO1	Room 1220	1 PM – 2:15 PM	12:45 PM
PM Oral 2	AO2	Room 1200	1 PM – 2:15 PM	12:45 PM
PM Oral 3	AO3	Room 2180	1 PM – 2:15 PM	12:45 PM
PM Oral 4	AO4	Room 1220	2:45 PM – 4:00 PM	2:30 PM
PM Oral 5	AO5	Room 1200	2:45 PM – 4:00 PM	2:30 PM

MORNING SESSION: 8 AM—12 PM

Poster Sessions

Poster Session 1

8 AM – 9:45 AM

1st Floor Lobby – Posters 1-7

Moderator: Kendall McKinnon

Evaluators:

1. Dr. Beth Peterman
2. Dr. Hussein Gharakhani
3. Dr. Rabia Amen

Participants:

1. Rejane S. Paulino, Agricultural and Biological Engineering, Assessment of glint correction algorithms for Sentinel-3 OLCI over Mississippi Sound.
2. Asifur Rahman, Agricultural and Biological Engineering, Developing a UGV Rover with Reconfigurable Chassis to Collect Plastic Contaminant from Cotton Fields.
3. Yasas Gamagedara, Agricultural and Biological Engineering, Enhancing Soil Property Prediction Accuracy Using Calibration Transfer in Mid-Infrared Diffuse Reflectance Spectroscopy.
4. Mohammad Abdus Shahid Rafi, Electrical and Computer Engineering, Employing UAS-based GNSS-R, LiDAR, and multispectral data for soil moisture estimation: insights from a three-year field study.
5. Arpita Deb, Comparative Biomedical Sciences, Investigating aryl hydrocarbon receptor (AHR) ligands effect on IgG2a- and IgG2b-triggered signaling in innate cells
6. Fenny Patel, Comparative Biomedical Sciences, Single-cell RNA transcriptomics of channel catfish gills response to virulent Aeromonas hydrophila infection.
7. Bipin Paudel, Forestry, Predicting Leaf Area in Eastern Cottonwood and Poplar Hybrids Using Allometric and Site Data Across Diverse Experimental Sites.

Poster Session 2

8 AM – 9:45 AM

1st Floor Lobby – Posters 8-14

Moderator: Kendall McKinnon

Evaluators:

1. Dr. Sidney Creutz
2. Dr. Anuraj Kshirsagar
3. Dr. Sara Vick

Participants:

1. Ana-Maria Valencia, Chemistry, Development of Degradable Polystyrene Derivatives for Sustainable Polymer Applications
2. Azeezat Faderera Abdulraheem, Chemistry, Education, Arts and Sciences, and Business, Synergistic adsorption of Pb (II) from aqueous solution using calcined biochar-bentonite clay hybrid
3. Malki Omesha Perera, Chemistry, Education, Arts and Sciences, and Business, Novel Synthesis of Yttrium Alloyed La2S3 Nanocrystals
4. Mayra Vazquez, Chemistry, Education, Arts and Sciences, and Business, Hydrogenation/N-Silylation of indoles catalyzed by a bimetallic Pt-Ga complex
5. Carlee Secrist, Chemistry, Agriculture and Life Sciences, Exploring the Catalytic Capabilities of a NU-1000 Catalyst with Ni Organometallic Linkers

Poster Session 3

8 AM – 9:45 AM

1st Floor Lobby – Posters 15-21

Moderator: Kendall McKinnon

Evaluators:

1. Dr. Misbah Munir
2. Dr. Shiveeli Rajput

Participants:

1. Alyssa Lea Miller, Plant and Soil Sciences, Field Assessment of Herbicide Tolerance in the Beauregard Sweetpotato (Ipomoea batatas) to Various Herbicide Chemistries
2. Durga Purushotham Mahesh Chinthalapudi, Plant and Soil Sciences, The Role of Nitrogen and Sulfur Fertilization in Shaping Soybean Root Associated Microbial Diversity and Enzyme Activity in Soybean
3. Lahari Nekkalapudi, Plant and Soil Sciences, Exploring Soil Microbial Responses to Cover Crops and Nitrogen in Sweet Potato Production Systems
4. Jasmine Sahota, Plant and Soil Sciences, Utilizing Insect Frass: A Sustainable Approach to Organic Fertilization in Agriculture
5. Chami Rampati Dewage, Plant and Soil Sciences, Effects of Low Nitrogen and Drought Stress on Finger Millet Yield Components

Poster Session 4

10 AM – 11:45 AM

1st Floor Lobby – Posters 1-7

Moderator: Julie Stepp

Evaluators:

1. Dr. Michelle Taylor
2. Dr. Patricia Hampshire
3. Dr. Melody Fisher

Participants:

1. Lydia Bailey, Anthropology and Middle Eastern Cultures, Comparative analysis of periodontal disease between individuals with early and late stage acquired syphilis
2. Amber Crenshaw, Counseling, Higher Education Leadership, Educational Psychology, and Foundations, School Bullying Uncovered: Insights from Middle Schoolers
3. Maria Haider, Kinesiology, Feasibility and Effectiveness of a Dance Program for People with Down Syndrome Using Self-Determination Theory
4. Shamaria M. Mosley, Teacher Education and Leadership, Engaging Families with Children with Disabilities in Mississippi's Early Learning Centers and Daycares
5. Clifford Boateng, Geosciences, Assessing the Socioeconomic and Environmental Determinants of Asthma Prevalence in the Mississippi Delta: A Spatial and Statistical Analysis
6. Jephthah N. Marfo, Geosciences, Assessing the Impacts of Flooding on Agricultural Lands and Settlements in the Southern Mississippi Delta Using Remote Sensing and Geospatial Techniques
7. Tanmoy Malaker, Geosciences, Spatiotemporal analysis of urban water hardship using historical boil water notices
8. Nishat Shermin, Geosciences, A Comparative Machine Learning Approach Integrating UAS and Multispectral Imagery for Classifying Fractional Vegetation Cover in Rangelands

Poster Session 5

10 AM – 11:45 AM

1st Floor Lobby – Posters 8-14

Moderator: Julie Stepp

Evaluators:

1. Dr. Joel Komakech
2. Dr. Tibor Pechan
3. Dr. Shiveeli Rajput

Participants:

1. Emma Berry/Molly Campbell, School of Human Sciences, When the Teacher Becomes the Student: A Reflection-Based Analysis of a Teaching Academy for University Faculty
2. Jackson Horton, School of Human Sciences, Transforming Teaching: Enhancing Faculty Teaching and Student Learning
3. Kasey Elder, Animal and Dairy Science, Effects of Late Gestational Melatonin Supplementation on Behavior and Growth Characteristics in Angus Beef Cows and Calves
4. Megan Mills, Animal and Dairy Sciences, Impact of oral melatonin supplementation on sperm quality and testicular artery hemodynamics in the bull
5. Sharon Damilola Samuel, Biochemistry, Nutrition and Health Promotion, Association between household food security, maternal dietary quality and breastfeeding duration: An analysis of NHANES 2015-2018
6. BOATENG, RICHARD, Biological Sciences, Development of hybrid actin constructs to identify a role for the actin amino terminus in occidiofungin susceptibility.

Poster Session 6

10:00 AM-11:45 AM

1st Floor Lobby – Posters 15-21

Moderator: Julie Stepp

Evaluators:

1. Dr. Misbah Munir
2. Dr. Waqar Shafqat

Participants:

1. Oluwadamilare Emmanuel Oloyede, Plant and Soil Sciences, Developing a model to estimate greenhouse gas fluxes and evapotranspiration using machine learning and remote sensing data
2. Pankaj Prashad Joshi, Plant and Soil Sciences, Automated Furrow Irrigated Rice Production System Mitigates Greenhouse Gas Emission in Rice
3. Bala Subramanyam Sivarathri, Plant and Soil Sciences, Investigating the Impact of Biostimulants on Physiology and Seed Yield under Heat Stress
4. Apphia Santy, Plant and Soil Sciences, Growing Raspberries in the South: Uncovering Heat-Tolerant Varieties for Mississippi
5. Tamara Heck, Plant and Soil Sciences, Memory Induced by Recurrent Drought Stress in Chirca (Acanthostyles buniifolius)

ORAL SESSIONS 8-9:30 AM

Oral Session 1

8 AM – 9:30 AM

Room 1220

Moderator: Ridwan Ayinla

Evaluators:

1. Dr. Katerina Sergi
2. Dr. Sheida Riahi
3. Dr. Iva Ballard

Participants:

1. Trinity Baynham, History, Words of War: How Misinformation Shapes Conflict and Forges Alliances Through History
2. Emmanuel Somali, Classical and Modern Languages and Literature, Reforestation as a Remedy: Lessons from L'Homme qui plantait des arbres to Counteract Environmental Degradation from Galamsey in Ghana
3. Madison Bibbs , Psychology, Parental Internalizing Problems and Emerging Adult Emotion Regulation: Moderation by Gender
4. Md Shahnewaz Hossain, Geosciences, Mapping Social Susceptibility to Climate Impacts in the Mississippi Delta: A Pathway to Environmental Justice
5. Sk Nafiz Rahaman, Geosciences, A Comparative Machine Learning Approach to Map Seasonal Groundwater Salinity Intrusion in the Mangrove Surrounded Coastal Regions of Bangladesh

Oral Session 2

8 AM – 9:30 AM

Room 1200

Moderator: Samrat Sikdar

Evaluators:

1. Dr. George Awuni
2. Dr. Lekshmy Valsala Sankara Pillai
3. Dr. Joshua Bumgarner

Participants:

1. Ruchita Bhattarai, Plant and Soil Sciences, AI in Agriculture: Optimizing corn hybrid genetics for future climates
2. Nestor Cordero, Plant and Soil Sciences, Status of Amaranthus spp. Susceptibility to S-Metolachlor in Mississippi
3. Apphia Santy, Plant and Soil Sciences, Growing Raspberries in the South: Uncovering Heat-Tolerant Varieties for Mississippi
4. Bala Subramanyam Sivarathri, Plant and Soil Sciences, Genetic Diversity in Roots and Nodules of Soybean under Water-Deficit conditions
5. Kerington Bass , Plant and Soil Sciences, Evaluation of Plant Growth Regulators on Sweetpotato Slip Propagation
6. Bruna Dal'Pizol Novello, Plant and Soil Sciences, Dose-response curve of an allelochemical with potential for a new herbicide mechanism of action.

Oral Session 3

8 AM – 9:30 AM

Room 2180

Moderator: Curtis Coleman

Evaluators:

1. Dr. Shankar Ganapathi Shanmugam
2. Dr. Stephanie King
3. Dr. Galen Collins

Participants:

1. Afra Anan Bhuiyan, Biochemistry, Nutrition and Health Promotion, Validating Rps6ka6 and Pou3f4 as Possible Candidate Genes Linked to Variability in Muscle Mass
2. Maryam Javanpour, Biochemistry, Nutrition and Health Promotion, Activation of 26S Proteasome by the Secondary Messenger cGAMP
3. Edirisa Juniour Nsubuga, Biochemistry, Nutrition, and Health Promotion, Prevalence and Determinants of Growth and Anemia Among Children Aged 6–59 Months in Busoga Region, Uganda, May–June 2024
4. Sujin Lee, Biochemistry, Nutrition, and Health Promotion, Detoxification of gossypol from cotton by UDP-glycosyltransferase in the cotton pest Helicoverpa zea
5. Gifty Lad Ayela, Agricultural Economics, Developing Site-Specific Water Response Functions using Historical Soil Moisture Data
6. Faria Noshin, Agricultural Science and Plant Protection, Evaluation of electronic noses(e-noses) for insect pest monitoring under greenhouse condition

Oral Session 4

8 AM – 9:30 AM

Room 2240

Moderator: Abhishek Panchadi

Evaluators:

1. Dr. Ling Li
2. Dr. Tatiana Lobato de Magalhaes
3. Dr. Matt Griffin

Participants:

1. Prattay Dey, Biological Sciences, Dual Pneumococcal Protein-Based Vaccine Strategy: Targeting ANXA2-Adhesins and Decoding Host Receptors in Human Epithelium
2. Ramtin Vamenani, Biological Sciences, Enhancing Nutritional Content in Sweet Potato through the Orphan Gene QQS: A Metabolic Engineering Approach
3. Sharnali Das, Biological Sciences, Investigating the Functional Roles of Genes with Identical Sequences in Both Mitochondria and Nucleus
4. Roberto Venta, Chemistry, Alternative poly (ester acetal)s as degradable replacement for commodity plastics
5. Achini Mala Sri Ovitigala, Physics and Astronomy, Temperature and pressure dependence of the reaction between BrHg and O3

Oral Session 5

8 AM – 9:30 AM

Room 2130

Moderator: Jennifer Burt

Evaluators:

1. Dr. Arun Venugopalan
2. Dr. W. Brien Henry

Participants:

1. Divya Rose, Pathobiology and Population Medicine, Antibiotic Resistance in Microbial Communities from Catfish Culture Systems: A Cross-Sectional Analysis
2. Sujita Balami, Pathobiology and Population Medicine, Identification of Potential Live-Attenuated Vaccine Candidate Against Edwardsiella piscicida in Channel Catfish (Ictalurus punctatus) × Blue Catfish (I. furcatus) Hybrids.
3. Hemraj Kathayat, Comparative Biomedical Sciences, Development of Efflux Pump Mutants in Edwardsiella ictaluri
4. Mercy Ogunruku, Sustainable Bioproducts, Wood Science Education in the United States: A Comprehensive Review of Challenges, Strategies and Future Directions
5. Jaydon Gibson, Biomedical Engineering, Perfusion-Compression Bioreactor System for Osteogenesis in Polymer Scaffolds

Oral Session 6

10:00AM – 11:30 AM

Room 1220

Moderator: Ridwan Ayinla

Evaluators:

1. Dr. Ling Li
2. Dr. Tim Boltz

Participants:

1. Oluwaseyi E. Olomitutu, Plant and soil sciences, Impact of Planting Speed and Downforce on Corn Seeding
2. Sujan Poudel, Plant and Soil Sciences, Quantifying Resilience of Cowpea to Soil Moisture Deficit
3. Vijaykumar Hosahalli, Plant and Soil Sciences, Harnessing the Potential of Biostimulants to Mitigate Drought in Soybean
4. Alyssa Miller, Plant and Soil Sciences, The Evaluation of Sweetpotato (Ipomea batatas) Variety Tolerance to Different Herbicide Treatments in a Field Atmosphere
5. Emily Magee, Poultry Science, Evaluating The Effect of Feed Sanitizer Products on Feed Mill Equipment and its Impact on Feed Microbial Reduction
6. Jing Huang, Wildlife, Fisheries, and Aquaculture, Assessing Animal By-products and Soybean Meal as Potential Fish Meal Replacements in Channel Catfish (Ictalurus punctatus) Feeds

Oral Session 7

10 AM – 11:30 AM

Room 1200

Moderator: Samrat Sikdar

Evaluators:

1. Dr. Shankar Ganapathi Shanmugam
2. Dr. George Awuni

Participants:

1. Alekhya Chakravaram, Plant and Soil Sciences, Assessing natural diversity in finger millet for physiological and agronomic traits
2. Jason Kober, Plant and Soil Sciences, Is it time to reconsider plant populations for top Mississippi corn hybrids?
3. Durga Purushotham Mahesh Chinthalapudi, Plant and Soil Sciences, Drought-Induced Shifts in Rhizosphere Microbial Communities Across Developmental Stages of Cowpea Genotypes
4. Jasmine Sahota, Plant and Soil Sciences, Utilizing Insect Frass: A Sustainable Approach to Organic Fertilization in Agriculture
5. Lahari Nekkalapudi, Plant and Soil Sciences, Optimizing Nitrogen and Cover Crop Practices to Improve Soil Health and Microbial Communities in Sweet Potato Production
6. Mohan Kumar Bista, Plant and Soil Sciences, Resilience of finger millet to drought stress during the reproductive stages

Oral Session 8

10 AM – 11:45 AM

Room 2180

Moderator: Curtis Coleman

Evaluators:

1. Dr. Ayantha Senanayaka Mudiyanselage
2. Dr. Nuwan Wijewardane
3. Dr. Stephen Torri

Participants:

1. Diego Galindo, Civil and Environmental Engineering, Temporal analysis of curve number across the united states: Implications of climate change
2. Amirhossein Eskorouchi, Industrial and Systems Engineering, Knowledge-Informed Learning for Automated Detection of Extracapsular Extension in Head and Neck Cancer
3. Jesus Ortiz, Rula School of Civil and Environmental Engineering, Regional Variability in Curve Number Adjustments: Evaluating Linear and Exponential λ Conversion Models
4. Andres Arias-Londono, Aerospace Engineering, Multi-task Learning for Rapid Online Adaptation under Signal Temporal Logic Specifications in Autonomous Systems
5. Cassia Brocca Caballero, Agricultural and Biological Engineering, Mapping Water Quality in the Mississippi Sound: Remote Sensing and Machine Learning for Multi-Parameter Assessment
6. Dakota Hester, Agricultural and Biological Engineering, Learning with less: high spatial resolution land cover classification under label-scarce conditions with large-scale self-supervised pre-training and transfer learning.
7. Thainara Lima, Agricultural and Biological Engineering, A global Spectral Bandpass Adjustment Function (SBAF) to build Harmonized Landsat-Sentinel over Inland and Coastal Waters

Oral Session 9

10 AM – 11:30 AM

Room 2240

Moderator: Bipin Bastakoti

Evaluators:

1. Dr. Taylor Heckman
2. Dr. Oladayo Apalowo

Participants:

1. Jianing Liang, Forestry, A Meta-analysis of Afforestation on Soil Greenhouse Gas Emissions
2. Nasir Qadir, Forestry, Developing aboveground biomass models for hardwood species in conservation reserve program practices with trees
3. Samjhana Panthi, Forestry, Determining vertical price transmission relationship in the timber supply chain in the Unites States South using STAR model
4. Elizabeth Esser, Forestry, Early findings in the hunt for autotoxic methods to control cogongrass (Imperata cylindrica)
5. Pratyush Dhungana, Forestry, County Level Aboveground Forest Biomass Estimation Using Remote Sensing Derived Auxiliary Information

Oral Session 10

10 AM – 11:45 AM

Room 2130

Moderator: Jennifer Burt

Evaluators:

1. Dr. Aqil Tariq
2. Dr. Tatiana Lobato de Magalhaes

Participants:

1. Basant Pant, Wildlife, Fisheries, and Aquaculture, Determinants of landowner acceptance of increasing black bear populations in Mississippi
2. Camren Fraser, Wildlife, Fisheries, and Aquaculture, Exploring an image-based approach to estimating weight and condition in fish
3. Zoe Scott, Wildlife, Fisheries, and Aquaculture, Red-headed woodpecker nest site selection and nest survival in managed loblolly pine forests
4. Krista Ruppert, Wildlife, Fisheries, and Aquaculture, Movement, microhabitat, and metapopulations: An overview of Gopher Frog (Rana [Lithobates] capito) ecology in Alabama
5. Lily Thigpen, Wildlife, Fisheries, and Aquaculture, Seeing Through the Murky Waters: Mapping Environment Characteristics in a Typical Catfish Aquaculture Pond
6. Daniel Egerson, Wildlife, Fisheries, and Aquaculture, Addressing Knowledge Gaps in the U.S. Conservation Reserve Program: Co-Developing the CRP Menu Tool to Improve Landowner Decision-Making
7. Haley Hughes, Wildlife, Fisheries, and Aquaculture, Native Bee Response to Mechanical and Hydrologic Manipulations and Red Imported Fire Ants in Seasonal Wetlands

AFTERNOON SESSION: 1:00 – 4:00 PM

Poster Sessions

Poster Session 1

1:00 PM – 2:20 PM

1st Floor Lobby – Posters 1-5

Moderator: Aidan Dickerson

Evaluators:

1. Dr. Rabia Amen
2. Dr. Maural Sowlat

Participants:

1. Rideeta Islam Aishy, Comparative Biomedical Sciences, Evolutionary Insights into Colistin Resistance and Fitness Costs in Edwardsiella ictalurid
2. Fenny Patel, Comparative Biomedical Sciences, Investigating the Antimicrobial Resistance Evolution of Edwardsiella piscicida to Florfenicol
3. Sydney O'Donald, Comparative Biomedical Sciences, Investigating the role of Double-Crested Cormorants in aquaculture bacterial pathogen transmission through Hi-C sequencing
4. Jianing Liang, Forestry, Comparative Analysis of Soil Nitrogen Mineralization and Nitrification in Hardwood and Softwood Afforestation in the Southeast US
5. Luke A. Ferguso, Forestry, Generalized aboveground biomass equation for eastern cottonwood.

Poster Session 2

1:00 PM – 2:20 PM

1st Floor Lobby – Posters 10-14

Moderator: Aidan Dickerson

Evaluators:

1. Dr. Nisarga Kodadinne Narayana
2. Dr. Angelica Abdallah Ruiz

Participants:

1. Muhammad Hamza, Sustainable Bioproducts, Nano-cellulose derived aerogel for removal of PFAS contaminants from water
2. Damilola Taiwo, Sustainable Bioproducts, Testing the efficacy of biopesticide compounds in guayule resin on southern pine beetle
3. Tyler Redman, Wildlife, Fisheries, and Aquaculture, The effects of hydrologic connectivity on bacterial dispersion in stream networks using eDNA detection
4. Daniel Egerson, Wildlife, Fisheries, and Aquaculture, Enhancing Landowner Engagement in the U.S. Conservation Reserve Program: Exploring the CRP Menu Tool to Support Informed Decision-Making.

Poster Session 3

1:00 PM – 2:20 PM

1st Floor Lobby – Posters 15-20

Moderator: Aidan Dickerson

Evaluators:

1. Dr. Bita Valizadeh Gever
2. Dr. Madhav Dhakal
3. Dr. Bashiru Adams

Participants:

1. Dylan Williams, Plant and Soil Sciences, Optimizing agricultural practices: synergistic effects of rotations, tillage, cover crop, and nitrogen
2. Alekhya Chakravaram, Plant and Soil Sciences, Genetic loci underlying physiological and agronomic traits revealed by GWAS in soybean
3. Mohan Kumar Bista, Plant and Soil Sciences, Characterizing Cotton Cultivars for Heat Stress Tolerance During the Reproductive Stage
4. Sujan Poudel, Plant and Soil Sciences, Effects of Reduced Irrigation on Cowpeas: Plant Health, Leaf Reflectance, and Growth
5. Edirisa Juniour Nsubuga, Biochemistry, Nutrition, and Health Promotion, Gender-Specific Interactions Between Obesity, Alcohol Consumption and Salivary Stress Biomarkers Among College Students in United States

Poster Session 4

2:30 PM – 4:00 PM

1st Floor Lobby – Posters 1-5

Moderator: Mohammad Nafe Assafi

Evaluators:

1. Dr. Mehdi Ghahremani
2. Dr. Morgan Flow
3. Dr. Brittany Lancaster

Participants:

1. Taylor F. Moore, Counseling, Higher Education Leadership, Educational Psychology, and Foundations, Using Behavioral Skills Training to Teach Novice Behavioral Professionals Literature Searching Skills
2. Georgia Starr, Kinesiology, Does A Swimming Program Increase Self-Efficacy in Individuals With Intellectual Disability? A Qualitative Study
3. Allison Harvey, Geosciences, Identifying How NWS Meteorologists Localize and Personalize Hazard-Specific Messaging for Core Partners
4. Mohammed Omar Sahed Chowdhury, Geosciences, Estimation of Carbonate System Parameters over an Oyster Reef using Unmanned Aerial Systems (UAS) imagery and Autonomous Surface Vessel (ASV) Data
5. Joe Mensah, Geosciences, Spatial Hotspot Analysis of Non-Communicable Diseases and Air Pollutants in the Lower Mississippi Valley: A GIS-Based Approach to Public Health Disparities

Poster Session 5

2:30 PM – 4:00 PM

1st Floor Lobby – Posters 10-14

Moderator: Mohammad Nafe Assafi

Evaluators:

1. Dr. Mohammad Rahman
2. Dr. Suraj A. Yadav

Participants:

1. Emmanuel Ankomah, Chemistry, Design and Synthesis of SWIR Probes for Bioimaging
2. Hari Giri, Chemistry, Modulating Conductivity, Redox Activity, and Optoelectronic Properties in Phenothiazine/Biphenyl Polyaniline Derivatives through Side-Chain Modifications
3. Rishita Garg, Computational Engineering, Understanding the Phenology and Mapping of Needle Blight Disease in Loblolly Pines Across Mississippi
4. Ander Talley, Computer Science and Engineering, Representing point clouds as compressed bitarrays
5. Umesh Chandra Biswas, Computer Science and Engineering, Softening the Impact of Collisions in Contention Resolution

Poster Session 6

2:30 PM – 4:00 PM

1st Floor Lobby – Posters 15-20

Moderator: Mohammad Nafe Assafi

Evaluators:

1. Dr. Hala Eldaous
2. Dr. Serge Kameni Leugoue

Participants:

1. Samrat Sikdar, School of Human Sciences, A scientific evaluation of a 4-H spring break “robotics” camp in Mississippi
2. Katherine Kennedy, Animal and Dairy Science, Effect of Melatonin Supplementation on Fatty Acid Transport During Maternal Nutrient Restriction
3. Larry Leon-Medina, Animal and Dairy Sciences, Analysis of seasonal, sex, and age group effects on weight and parasitic load in a Spanish goat herd in Mississippi
4. Maxwell Muriuki Mkunga, Animal and Dairy Sciences, Preliminary Results of Manual vs. LiDAR Scan Measurements of Carcass Traits in Bovines: A Comparison.

Oral presentations 1:00 – 4:00 PM

Oral Session 1

1:00 PM – 2:15 PM

Room 1220

Moderator: Fnu Anshu

Evaluators:

1. Dr. Omar Martinez Caranton
2. Dr. Navneet Kaur

Participants:

1. Sagar Bhandari, Agricultural Science and Plant Protection, Critical Time Points for Common Virus Infections in Honey Bee (Apis mellifera) Queen Production
2. Oluwadamilare Emmanuel Oloyede, Plant and Soil Sciences, Effect of alternate wetting and drying with automated tailwater reuse on greenhouse gas emissions in rice production
3. Pankaj Prashad Joshi, Plant and Soil Sciences, Mitigating Greenhouse Gas Emissions Using Improved Nitrogen Management Strategies in Corn
4. Minel Guler, School of Human Sciences, Solo and Social Gaming Patterns Among Adults and Predictors of Gaming Patterns: A Cluster and Binary Logistic Regression Analyses
5. Hari Giri, Chemistry, Modulating Conductivity, Electrochemical Activity, and Optoelectronic Properties in Phenothiazine/Biphenyl Polyaniline Derivatives through Side-Chain Modifications

Oral Session 2

1:00 PM – 2:15 PM

Room 1200

Moderator: Prasanna Bayalusime

Evaluators:

1. Dr. Jessie Cossitt
2. Dr. Rizwan Farooqui

Participants:

1. Md Ebtidaul Karim, Electrical and Computer Engineering, Reflected GPS signal based smart circular Pivot Irrigation System
2. Iffat Ara Ebu, Electrical and Computer Engineering, Comparative Analysis of Model Predictive Control algorithm for Lateral Vehicle Control in ADAS
3. Md Zakir Hasan, Electrical and Computer Engineering, Dynamic Environment-Aware Lifetime Prediction of SiC MOSFET Modules Through LSTM
4. Mohammad Abdus Shahid Rafi, Electrical and Computer Engineering, Assessment of the comprehensive process flow for machine learning-based crop yield estimation using multi-sensor data for corn and cotton.
5. Bidya Debnath, Electrical and Computer Engineering, Experimental Demonstration of Flying UAV Swarm-Based Reconfigurable Yagi-Uda Antennas

Oral Session 3

1:00 PM – 2:15 PM

Room 2180

Moderator: Ruchita Bhattarai

Evaluators:

1. Dr. Hilary DeShong
2. Dr. Mehdi Ghahremani
3. Dr. Paula Mabry

Participants:

1. Diana Marcela Herrada Rios, Classical and Modern Languages and Literatures, “Las malas” and transvestite motherhood as resistance in the face of abjection.
2. Emmanuella Abaidoo Kwarteng, Classical and Modern Languages and Literature, Reframing Monstrosity: Ecological, Moral, and Existential Dimensions in L’homme qui plantait des arbres by Jean Giono, Alma by J.M.G. Le Clézio, and Le Malentendu by Albert Camus
3. Nana Yaa Gyamfi, Classical and Modern Languages and Literatures, Foreign Aid: The 'Messiah' or a Mirage for Africa's Development?
4. Alexis Cutshall, Anthropology and Middle Eastern Cultures, Intersectionality, Stress, and Frailty in Post-Medieval London: Estimating Group-Specific Risks of Mortality and Resilience

Oral Session 4

2:45 PM – 4:00 PM

Room 1220

Moderator: Fnu Anshu

Evaluators:

1. Dr. Monzur Chowdhury
2. Dr. Kristin Javorsky

Participants:

1. Carlos Rivera,Forestry, Unraveling population structure and genetic diversity of eastern cottonwood from the U.S. Forest Service breeding program
2. Sitha Som, Wildlife, Fisheries, and Aquaculture, Investigating Plant Community Structure along the Sre Ambel Floodplain, Southwest Cambodia
3. Tobin J. Davidson, Wildlife, Fisheries, and Aquaculture, eDNA surveillance and population genomics of the invasive Pond Loach (Misgurnus anguillicaudatus) introduced to the United States

Oral Session 5

2:45 PM – 4:00 PM

Room 1200

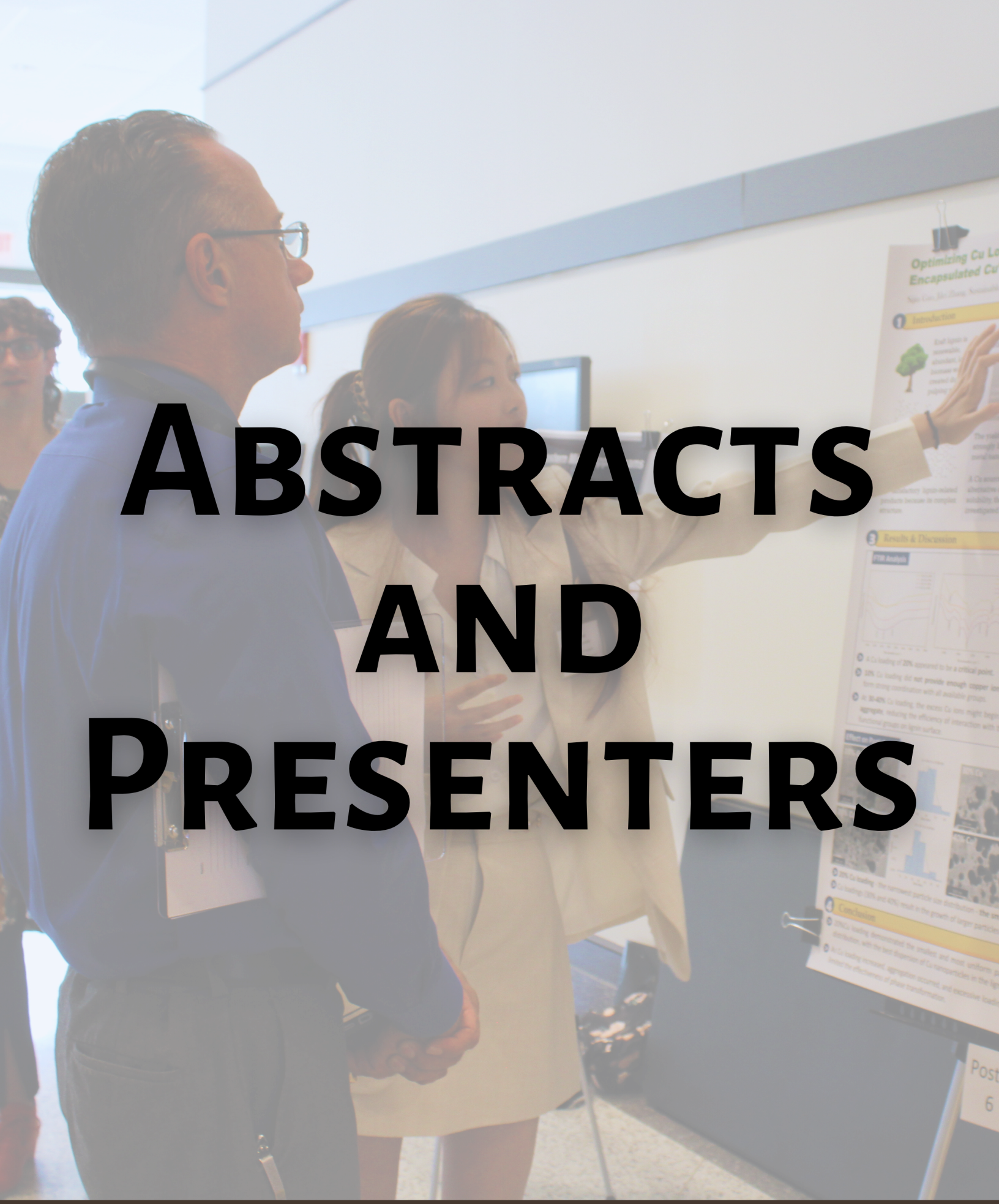
Moderator: Hemraj Kathayat

Evaluators:

1. Dr. Jessie Cossitt
2. Dr. Rizwan Farooqui

Participants:

1. Md Masiat Roushan Masrafee, Agricultural and Biological Engineering, Enhancing Precision Agriculture with AI: Deep Learning-Based Cotton Weed Classification
2. Bhavana Gubbi Prakash, Civil and Environmental Engineering, Assessing Sediment Sources: Temporal Variation Analysis of Suspended Sediments (1983-2005)
3. Hafez Ahmad, Geosciences, Remote Sensing and Machine Learning for Long-Term Water Quality Monitoring in the Western Mississippi Sound
4. Shaibal Ahmed, Geosciences, Advancing Soybean Yield Forecasting: Comparing Statistical and Machine Learning Techniques with Sentinel-2 Data



Abstracts and Presenters

Presenter: Sagar Bhandari

Presentation Session: AO1

Level of Study: Master's

Department: Agricultural Science and Plant Protection

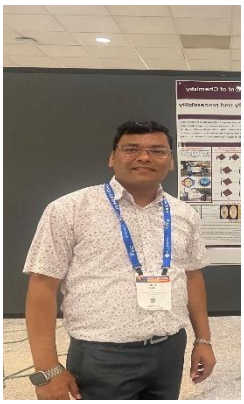
Category: Agriculture and Life Sciences

Advisor: Dr. Esmaeil Amiri, Asst Extension/Research Prof, Agricultural Science and Plant Protection

Title: Critical Time Points for Common Virus Infections in Honey Bee (Apis mellifera) Queen Production

Abstract: As the only fertile female in a colony, the honey bee queen is primarily responsible for laying eggs and regulating various colony functions through her pheromones. Among many biotic and abiotic stressors affecting queen quality, viruses are considered a major health concern. Therefore, a comprehensive understanding of virus transmission routes and sensitive developmental stages to viral infections is essential for reducing or preventing viral infections in queens. To address this, we conducted a series of controlled experiments and surveys in commercial queen-producing operations, covering the entire queen-production process. Using the RT-qPCR approach, we tested seven honey bee viruses including DWV type A and B, BQCV, LSV, CBPV, SBV, and IAPV. Regardless of the virus type, our results clearly show the importance of vertical and venereal transmission routes in queen infections. Queens are highly vulnerable in the early stages of development, highlighting the importance of selecting healthy breeder queens. Although we detected high virus levels in nurse bees, virus levels in royal jelly were very low or undetectable, suggesting that the vertical transmission from infected breeder queens is the primary pathway for viral spread. Additionally, we found that mated queens carried significantly higher virus loads than virgin queens, highlighting mating as another critical transmission point. This finding emphasizes the need to produce healthy mature drones during queen mating period. Furthermore, virus loads in queens were consistently higher in banked colonies compared to mating nucs, suggesting that the practice of queen banking may contribute to increased virus levels in honey bee queens.

Presenter: Hari Giri



Presentation Session: AO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Colleen Scott, Associate Professor, Chemistry

Title: Modulating Conductivity, Electrochemical Activity, and Optoelectronic Properties in Phenothiazine/Biphenyl Polyaniline Derivatives through Side-Chain Modifications

Abstract: Conductive polymers (CPs), especially polyaniline (PANI), have been a focus of interest since the 1970s due to their potential uses in energy storage devices, electrochromic devices, biosensors, and surface coatings. PANI is known for its adjustable conductivity, ease of synthesis, diverse electrochemical properties, environmental stability, and cost-effectiveness. However, PANI's limited solubility and electrochemical instability have restricted its widespread use. This study is dedicated to enhancing the processability and electrochemical stability of PANI derivatives through side-chain modification and copolymerization. We have developed unique phenothiazine/biphenyl-based polyaniline derivatives, each with distinct electron-donating and electron-withdrawing groups, such as –F, –CF3, –CH3, and –OCH3. These modifications establish crucial structure-property relationships and improve the electrochemical performance by adjusting the torsion angle between adjacent phenyl rings. These polymers were meticulously characterized using Proton Nuclear Magnetic Resonance (1HNMR), Fourier Transform Infrared Spectroscopy (FTIR), Ultraviolet-Visible Absorption Spectroscopy (UV/Vis), X-ray Diffraction (XRD), Cyclic Voltammetry (CV), thermogravimetric analysis (TGA), Differential Scanning Calorimeter (DSC), and Scanning Electron Microscopy (SEM), ensuring the reliability of our results. Our findings demonstrate that side-chain modifications have a significant impact on the solubility, crystallinity, conductivity, oxidation potentials, and morphology of PANI derivatives. The insights from our study will facilitate the optimization of PANI derivatives' performance by tuning the side-chain composition.

Presenter: Minel Guler

Presentation Session: AO1

Level of Study: PhD

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Benjamin Burke, School of Human Sciences

Title: Solo and Social Gaming Patterns Among Adults and Predictors of Gaming Patterns: A Cluster and Binary Logistic Regression Analyses

Abstract: Sixty-one percent of adults in the United States engage in video gaming weekly, and 74% of these gamers engage in social video gaming (Entertainment Software Association, 2024). Informed by the Neo-Ecological Theory (Navarro & Tudge, 2023), and the Bioecological Theory (Bronfenbrenner & Morris, 2006), video gaming is posited as a proximal process between the developing person and objects (e.g., controllers, screens) and symbols (e.g., narratives, content), and other gaming partners (when played in social contexts). Research often examines the impacts of gaming on well-being and relationships but has focused less on individual and social predictors of game engagement. This study aims to identify patterns of solo and social play based on gamers' preferences and satisfaction with solo and social gaming (i.e., with romantic partners, family members, and friends). Additionally, based on ecological theory considerations, we evaluate the predictive roles of person (e.g., age, gender) and context characteristics (i.e., perceptions of social support) in gaming patterns. The sample included 95 adult gamers (53.7% female, Mage = 33.4). A K-means cluster analysis was estimated to identify two subgroups based on their gaming frequency and satisfaction (see Figure 1). Age was the only significant predictor of participants' cluster membership (see Table 1 for results). Applying the Socioemotional Selectivity Theory (Carstensen, 1995), as people age, they might be more selective in their gaming partners; therefore, they might engage in video gaming with them more frequently and be more satisfied. This finding might especially inform the practices focusing on intergenerational relationships (Osmanovic & Pecchioni, 2016).

Presenter: Pankaj Prashad Joshi

Presentation Session: AO1

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. M. Dhakal, Assistant Research Professor, Mississippi Water Resource Research Institute

Title: Mitigating Greenhouse Gas Emissions Using Improved Nitrogen Management Strategies in Corn

Abstract: Corn production relies extensively on synthetic nitrogen (N) fertilizers, but it significantly contributes to rising atmospheric greenhouse gas (GHG) concentrations, especially N2O. Improved management strategies that optimize crop N uptake may reduce GHG emissions. Field experiments were initiated in May 2024 to evaluate two N application levels (Low: 246 kg N ha-1 and High: 297kg N ha-1 as Urea and Urea Ammonium Sulfate), N-stabilizer (No-stabilizer and 0.75 g ai N-(n-butyl)-thiophophoric triamide (NBPT) kg-1 Urea), fertilizer placement depths (0 and 10 cm) and post-fertilization management (closing trench with packer wheel and leaving open) on total seasonal carbon-dioxide equivalent (CO2e) emission (N2O, CH4 and CO2) and yield-scaled emission (YSE) in corn (Zea mays). Treatments were arranged in a randomized complete block design with four replications. Weekly to biweekly measurements of soil N2O, CH4 and CO2 fluxes were taken using trace gas analyzers and static flux chambers. Results indicated that high N rate increased seasonal CO2 emission by 12.89% than low rate. At low N rate, CO2e and YSE were reduced by 11.79% and 12.22%, respectively, compared to high N rate. Interactions between surface management and placement depth showed lower N2O emission in 10cm deep placement with closed trenches. Treatments had no impact on grain yield. Hence, nitrogen management strategies suited to improve N use efficiency can reduce N2O emissions and overall GHG footprint of corn production.

Presenter: Oluwadamilare Emmanuel Oloyede

Presentation Session: AO1

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Madhav Dhakal, Assistant Research Professor, Mississippi Water Resources Research Institute

Title: Effect of alternate wetting and drying with automated tailwater reuse on greenhouse gas emissions in rice production

Abstract: The traditional method of rice production by continuous flooding places high demand on freshwater, and results in high global warming potential (GWP) due to the anaerobic conditions it creates. Management practices that discontinue flooding can reduce freshwater demand, reduce methane emission, and ultimately make irrigated rice production sustainable. Field trials were initiated in 2024 at farmers field in Mississippi Delta to (i) evaluate irrigation management systems – continuous flooding and row rice (alternate wetting and drying with automated tailwater recirculation) - in greenhouse gas (GHG) emissions and global warming potential; (ii) quantify ecosystem exchange and evapotranspiration (ET); and (iii) develop models to predict crop water use and ecosystem exchanges in rice production. Treatments will be replicated three times in a randomized complete block design. Methane flux will be measured using open path (non-dispersive infrared spectroscopy) gas analyzers, and carbon dioxide and water fluxes will be measured using open path (wavelength modulation spectroscopy) gas analyzers in Eddy Covariance system on the fields. Measured yield data including 1000 grain weight, grain yield, harvest index and above ground biomass are subjected to analysis of variance. Significantly different means are separated using Tukey's HSD. The results of the study are expected to show a significant decrease in freshwater demand, increase in water use efficiency, reduction in CH4 emission, and reduction in GWP as influenced by row rice system in rice production.

Presenter: Bidya Debnath

Presentation Session: AO2

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. Junming Diao, Assistant Professor, Electrical and Computer Engineering

Title: Experimental Demonstration of Flying UAV Swarm-Based Reconfigurable Yagi-Uda Antennas

Abstract: This work presents a novel approach to deploying wireless systems on UAV swarms, addressing synchronization and positional accuracy challenges. By using passive elements, it eliminates the need for frequency and phase synchronization, while a magnetic connection ensures stable UAV positioning. This enables the formation of a reconfigurable 500 MHz Yagi-Uda antenna with multiple UAVs. Experimental results from a three-UAV setup demonstrate improved gain, reduced complexity, and stable performance, making this design ideal for UAV swarm-based wireless communication.

Presenter: Md Ebtidaul Karim

Presentation Session: AO2

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. John Ball, Professor, Electrical and Computer Engineering

Title: Reflected GPS signal based smart circular Pivot Irrigation System

Abstract: Smart irrigation has become crucial to sustainable agriculture due to increasing water scarcity and climate change. It optimizes water use by delivering the right amount at the right time, tailored to crop needs, thereby enhancing productivity. Accurate soil moisture (SM) prediction plays a central role, offering real-time insights into soil hydration to enable data-driven irrigation management. This prevents both under-watering and over-watering, conserving water and fostering healthy crop growth. A popular irrigation method in North America is the circular pivot system, valued for its efficiency in conserving water, energy, and labor. This study presents a scalable, cost-effective technique that estimates high-resolution soil moisture using reflected global positioning system (GPS) signals, eliminating the need for expensive unmanned aircraft (UAS) or ground vehicles (UGV). Global navigation satellite system reflectometry (GNSS-R) receivers are placed along circular pivots to capture surface-reflected GPS signals at specular points (SPs). A simulation replicating a 382.93-meter circular pivot field centered at 33° 09'34" N, 88° 28'27" W divided the field into 5x5 meter grids. Data from GPS, GLONASS, and Galileo satellites were analyzed. Results showed that a single receiver at the pivot midpoint monitored moisture across 5 to 6 adjacent grids in a 12-hour rotation. Uniform receivers spaced 25 meters apart covered 99.08% of the field grids, ensuring comprehensive SM estimation. This approach reduces dependency on costly technologies, enhancing irrigation efficiency and cutting operational costs, with the potential to significantly improve water conservation and crop yields.

Presenter: Iffat Ara Ebu

Presentation Session: AO2

Level of Study: Master's

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. John Ball, Professor, Electrical and Computer Engineering

Title: Comparative Analysis of Model Predictive Control algorithm for Lateral Vehicle Control in ADAS

Abstract: Autonomous functionalities in Advanced Driver Assistance Systems (ADAS) are increasingly crucial to ensure collision-free and environmentally sustainable transportation. This study addresses the design and simulation of an Adaptive Model Predictive Control (MPC) algorithm for lateral vehicle control, employing a bi-cycle model to represent vehicle dynamics. The primary objective is to maintain lane-keeping performance by regulating steering angle and acceleration as manipulated variables, with vehicle position as the principal output. Simulations are conducted across various trajectories to evaluate the controller's performance under diverse driving scenarios. Furthermore, the proposed Adaptive MPC is compared against a traditional MPC control scheme. Quantitative and qualitative metrics—including lateral offset, yaw angle, and steering angle—are used to assess the comparative efficacy of the two approaches. The results indicate that while standard MPC can effectively maintain lane position, the Adaptive MPC demonstrates superior performance in scenarios involving significant nonlinearities, thereby enhancing overall control robustness. These findings suggest that MPC-based lateral control strategies, especially those adapted for varying vehicle parameters, hold promise for practical deployment in production-grade ECUs. This comprehensive evaluation of both MPC and Adaptive MPC underscores their feasibility and scalability for ADAS applications. Future work will focus on hardware-in-the-loop testing and real-world validations to confirm the effectiveness of these control strategies under diverse road and traffic conditions.

Presenter: Mohammad Abdus Shahid Rafi

Presentation Session: AO2

Level of Study: PhD

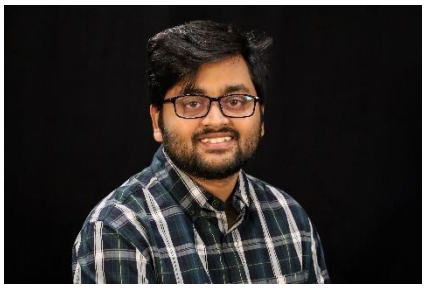
Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. John Ball, Professor, Electrical and Computer Engineering

Title: Assessment of the comprehensive process flow for machine learning-based crop yield estimation using multi-sensor data for corn and cotton.

Abstract: Accurate crop yield estimation is essential for data-driven decision-making and strategic planning in modern agriculture in the United States, where it supports sustainable productivity while addressing climate change and food security challenges. Effective yield prediction enables optimized resource management, including water, fertilizers, and pesticides, thereby improving agricultural efficiency and profitability. This study presents a comprehensive analysis of a machine learning (ML)-based approach for corn and cotton yield estimation, two of the six major crops in Mississippi and the US. The research was conducted over four consecutive seasons (2020–2023) on a 2.31-hectare field at the R.R. Foil Plant Science Research Center, Mississippi. Weekly data collection involved multispectral and LiDAR sensors mounted on unmanned aircraft systems (UAS), along with soil moisture and temperature measurements from volumetric probes, complemented by environmental data from a nearby weather station. The dataset consisted of over 30 features across five categories, with ground truth yield data collected from 235 plots over four years. Feature selection techniques, including Pearson's correlation coefficient filtering, recursive feature elimination wrapping, and recursive groupwise wrapping, were applied to optimize the input variables for three ML models: Feedforward Neural Networks (FNN), Long Short-Term Memory (LSTM), and Random Forest (RF). Model performance was evaluated using root mean square error (RMSE) and mean absolute error (MAE). Results showed that recursive groupwise wrapping was the most effective feature selection method, while LSTM achieved lower RMSE and MAE in field-wise validation. This study highlights the effectiveness of an ML-driven multi-sensor approach for corn and cotton yield estimation.



Presenter: Md Zakir Hasan

Presentation Session: AO2

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. Seungdeog Choi, Professor, Electrical and Computer Engineering

Title: Dynamic Environment-Aware Lifetime Prediction of SiC MOSFET Modules Through LSTM

Abstract: The state-of-the-art determines the remaining useful lifetime (RUL) through a steady-state, fixed power cycling tests (PCT) without considering the impact of dynamically changing environmental conditions. It has resulted in considerable RUL prediction errors in the real world. However, the dynamic changing conditions (e.g., large temperature swings) may affect the degradation evolution of SiC MOSFET, which could eventually result in RUL changes. Thus, it must be integrated to make accurate predictions. To precisely understand the RUL variation complexity, the junction temperature (Tj) has been measured with a Negative Thermal Coefficient (NTC) thermistor, Temperature Sensitive Electrical Parameter (TSEP), and these profiles have been modeled through the thermal model RC foster network using Extended Kalman Filter (EKF). Then, the on-state resistance (Rds,on) variations and Degradation Acceleration Factor (DAF) under the dynamic environment conditions are integrated into a lifetime prediction model to accurately predict the RUL through the Long Short-Term Memory (LSTM) machine learning algorithm.

Presenter: Alexis Cutshall

Presentation Session: AO3

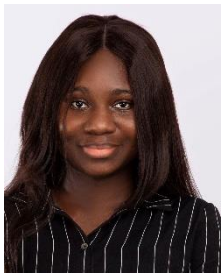
Level of Study: Master's

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Molly K. Zuckerman, Professor, Anthropology and Middle Eastern Cultures

Title: Intersectionality, Stress, and Frailty in Post-Medieval London: Estimating Group-Specific Risks of Mortality and Resilience

Abstract: Indices for estimating frailty and resilience in past individuals are increasingly being used in paleopathology. Recently, novel approaches have been proposed for estimating frailty and resilience that incorporate both hazards-based and indexical methods. Here, we develop resilience indices from skeletal biomarkers (presence/absence) associated with increased survival and decreased risk of mortality, specifically from four Postmedieval (16th - 19th centuries) London cemeteries: generally high socioeconomic status (SES) Chelsea Old Church and St. Benet Sherehog, and low-SES St. Bride's Fleet Street and Cross Bones. Kaplan-Meier survival and Cox proportional hazards analysis suggest increased resilience associated with osteoarthritis, periodontal disease, trauma, and absence of vitamin C deficiency. We applied this group-specific 4-biomarker resilience index to a subgroup of estimated adult female (n=119) and male (n=163) individuals from ascribed high- and low-SES burial contexts, and compared these indices to assess impacts of sex, status, and their intersections. Results showed that high-SES individuals exhibit significantly lower average resilience index values and older ages-at-death relative to low-SES individuals. Although resilience indices differed significantly between high- and low-SES males, no such differences were observed between high- and low-SES females. Within status groups, resilience indices did not vary significantly. While measures of cumulative stress, the indices here reflect distinct embodiments of resilience according to status; resilience in low-SES contexts translates into physiological weathering (e.g., degenerative lesions), while resilience in high-SES contexts conveys fewer pathological conditions. Ultimately, these findings demonstrate how Postmedieval socioeconomic systems preferentially benefited high-SES individuals, notably high-SES males.



Presenter: Nana Yaa Gyamfi

Presentation Session: AO3

Level of Study: Master's

Department: Classical and Modern Languages and Literatures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Keith Moser- Classical and Modern Languages and Literatures

Title: Foreign Aid: The 'Messiah' or a Mirage for Africa's Development?

Abstract: Foreign Aid: The 'Messiah' or a Mirage for Africa's Development?

This study critically examines whether foreign aid perpetuates dependency, limiting Africa's economic autonomy and political sovereignty, or whether it serves as a catalyst for sustainable development. Focusing on Kenya, Somalia, Ghana, and Burkina Faso, the research explores how aid affects governance, economic policies, and corruption. This study seeks to investigate the effectiveness of foreign aid in Africa, and policy recommendations for minimizing dependency and promoting sustainable development. By analyzing case studies from the aforementioned countries, this study addresses the complex question: To what extent does foreign aid foster self-sufficiency and growth, or does it continue to reinforce cycles of dependency and political instability? Furthermore, this transdisciplinary study applies theories such as Neocolonialism, Dependency Theory, and Public Choice Theory to assess the ways in which foreign aid influences governance structures, economic policies, and political autonomy. Finally, it proposes the "Aid to My Advantage (ATMA) Framework" as a conceptual framework to counter dependency on the Global North and promote self-sufficiency and sustainable development in the Global South.

Presenter: Diana Marcela Herrada Rios

Presentation Session: AO3

Level of Study: Master's

Department: Classical and Modern Languages and Literatures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sol Pelaez, Associate Professor and Spanish Section Head of Dept. of Classical & Modern Languages and Literatures

Title: "Las malas" and transvestite motherhood as resistance in the face of abjection.

Abstract: This essay explores how Las malas (2019) by Camila Sosa Villada portrays transgender motherhood as an act of resistance against abjection and social exclusion. By analyzing the character of Tía Encarna and argues that motherhood within transgender contexts transcends the patriarchal and heteronormative boundaries imposed by society, particularly in Latin America.

The work engages with Julia Kristeva's concept of abjection (2011) and Judith Butler's notion of queer resistance, while also incorporating critical perspectives from Sarah Valentín-Sánchez's Cuerpo abyecto (2024), Richard Leonardo-Loayza's work on agency and the abjection of the transgender body (2022), and Katarzyna Moszczyńska-Dürst's Queer Theory of Failure (2021). By combining literary and queer theory, the essay emphasizes how transgender motherhood in Las malas redefines narratives of exclusion, establishing a space for agency and social transformation. It also integrates bioethical and medical frameworks (Álvarez Díaz, 2009) to provide a multifaceted understanding of the issues explored in this study.

Presenter: Emmanuella Abaidoo Kwarteng

Presentation Session: AO3

Level of Study: Master's

Department: Classical and Modern Languages and Literature

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Keith Moser

Title: Reframing Monstrosity: Ecological, Moral, and Existential Dimensions in L'homme qui plantait des arbres by Jean Giono, Alma by J.M.G. Le Clézio, and Le Malentendu by Albert Camus

Abstract: This presentation examines the rhetoric of monstrosity in L'homme qui plantait des arbres by Jean Giono, Alma by J.M.G. Le Clézio, and Le Malentendu by Albert Camus, as it investigates its functions as a metaphor for ecological destruction, historical trauma, and moral alienation. In L'homme qui plantait des arbres, Giono portrays monstrosity through environmental degradation and abandonment, where exploitation of nature results in irreversible damage. He emphasizes the importance of consequential ethics of individuality as a counter to ecological monstrosity. Alma shifts the focus to historical monstrosity, addressing the legacies of colonialism. Moreover, monstrosity is embedded in systemic violence and cultural erasure, revealing how historical atrocities continue to shape identities and collective memory. Equally, the extinction of species, symbolized by the dodo bird, highlights the ecological consequences of the anthropogenic era, which reflects contemporary concerns about climate change and biodiversity loss. Camus' Le Malentendu investigates moral monstrosity through familial betrayal and existential absurdity. The characters' emotional detachment and moral indifference highlight how alienation can lead to ethical voids, where the absence of meaning fosters quiet, normalized violence. The central question guiding this analysis is: how do these authors depict monstrosity as a result of human disconnection from nature, history, and morality, critiquing postmodern existential and ethical crises? This comparative study seeks to demonstrate the different manifestations of contextualized monstrosity, in human relationships, and environmental interactions, and how they are shaped by ecological neglect, historical amnesia, and moral indifference.

Presenter: Tobin J. Davidson

Presentation Session: AO4

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Michael W. Sandel, Professor, Wildlife, Fisheries, and Aquaculture

Title: eDNA surveillance and population genomics of the invasive Pond Loach (Misgurnus anguillicaudatus) introduced to the United States

Abstract: Invasive species represent a growing threat to the ecosystems and economies of the United States. The southeastern United States represents an aquatic biodiversity hotspot, and a rapidly growing number of nonindigenous freshwater fishes are attributed to the decline of multiple native species already facing extinction. Presidential order 13751 describes the need for rapid and cost-effective tools to detect invasive species during the earliest stages of introduction, when mitigation and control efforts are most effective. Misgurnus anguillicaudatus is an escaped species from the aquarium trade with native origins from East Asia. Introduced populations in the southeastern United States pose a large threat to the Cahaba River Watershed; exploitation of sediment, uprooting of aquatic vegetation, and competition with native ichthyofauna for food resources negatively impact ecosystems post-introduction, thus threatening native populations in the region. This study includes development of noninvasive environmental DNA (eDNA) protocols designed for early detection of invasive freshwater fishes, specifically M. anguillicaudatus in the southeastern United States, and population genetics analyses to test the hypothesis that introduced populations in the United States are monophyletic. Alternatively, multiple populations may descend from distinct evolutionary lineages or species. Phylogenetic results indicate that there are three monophyletic populations of Misgurnus loaches in the United States. These results suggest multiple invasions of different loach species, providing additional complexity to the understanding and management of introduced habitats. Enhanced understanding in regard to the population genomics of this ecologically problematic species will contribute to the preservation of one of the world's most biodiverse temperate freshwater ecosystems.

Presenter: Carlos Rivera

Presentation Session: AO4

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Heidi Renninger, Forestry

Title: Unraveling population structure and genetic diversity of eastern cottonwood from the U.S. Forest Service breeding program

Abstract: Eastern cottonwood (Populus deltoides) is a model platform for carbon fixation and storage, phytoremediation, water and nutrient use efficiencies, biofuel quality, and urban site tolerance. Over time, the US Forest Service, in their Southern Research Station, has created a highly valuable clone collection from all Southeast states. These clones have shown high phenotypic performance increasing national and international demand for P. deltoides clones in the last decade, primarily driven by carbon sequestration applications for climate mitigation. Advances in molecular techniques make it possible to understand valuable information, such as fingerprinting genetic structure and diversity. This project aims to identify the population structure and produce and archive the molecular identities of P. deltoides Stoneville clones and their genetic diversity. Leaves were collected from 300 clones in the original stoolbed and breeding orchard in Stoneville, Mississippi. Genotyping from DNA extractions was performed using a probe SNP (Single Nucleotide Polymorphism) chip array. After quality cleaning and variant calling, 21,000 of the most informative SNPs were selected. Preliminary results from the first 95 accessions show six subpopulations based on their degree of relatedness with considerable genetic variance. The structure population was able to identify the origin of some unknown clones. The following steps are: (1) Include genotyping data from the remaining 205 clones, (2) Upload the genetic identity of each clone to an open-source repository for germplasm conservation purposes. Our results will provide critical first steps to ecological genetics for restoration with P. deltoides under USDA Forest Service programs and private NGO programs.

Presenter: Sitha Som

Presentation Session: AO4

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Sandra B. Correa, Associate Professor, Wildlife, Fisheries & Aquaculture

Title: Investigating Plant Community Structure along the Sre Ambel Floodplain, Southwest Cambodia

Abstract: The Sre Ambel River floodplain in southwest Cambodia (Southeast Asia) is considered one of the richest biodiversity hotspots in the coastal region of Cambodia. The rich floodplain ecosystem provides an enormous economic opportunity for more than 3,000 households to support their livelihoods. The Sre Ambel floodplain faces unsustainable utilization from illegal logging of the flooded forests, riparian forests, and mangroves for agriculture, infrastructure development, ecotourism, charcoal extraction, and new settlements. Although the floodplain ecosystem plays a vital role in maintaining ecological functions and biodiversity, little is known about its characteristics, forest species composition, and functionality. The Department of Wildlife, Fisheries, and Aquaculture of Mississippi State University partnered with the Wildlife Conservation Society- Cambodia Program to conduct a multidisciplinary collaborative project in this region. The research project aims to understand the spatial variability in tree species composition, assess forest health, and identify biodiversity and biomass hotspots of the forest ecosystem. Ground-truth data was collected to acquire relevant information for species diversity and distribution analyses. This research will measure tree species diversity, species richness, and tree growth metrics (tree height, diameter, and forest canopy cover). These results will be crucial to informing the Cambodian government on protecting and restoring this vital floodplain ecosystem for biodiversity conservation, forest management, wildlife conservation, and livelihood development.

Presenter: Hafez Ahmad

Presentation Session: AO5**,**

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Padmanava Dash

Title: Remote Sensing and Machine Learning for Long-Term Water Quality Monitoring in the Western Mississippi Sound

Abstract: Long-term water quality monitoring is essential for understanding and managing the health of aquatic ecosystems, especially as they face mounting pressures from climate change and increased human activities. This study investigates the long-term trends and seasonal drivers of water quality in the Western Mississippi Sound (WMS), a key estuarine ecosystem in the Gulf of Mexico, using a combination of field measurements and advanced remote sensing data. Field sampling was performed using an autonomous surface vessel equipped with sensors to measure key water quality indicators, such as chlorophyll-a (Chla), Colored Dissolved Organic Matter (CDOM), and turbidity, across the study area for model calibration and validation. Remote sensing data, particularly from Landsat and Sentinel-2 satellites, were used to derive predictor variables, including remote sensing reflectance and spectral indices. To ensure that the most relevant predictors were used in the analysis, multicollinearity analysis and advanced feature selection methods, such as recursive feature elimination and permutation importance, were applied. Among the machine learning (ML) models evaluated, the XGBoost algorithm was found to provide the best predictive performance. This model demonstrated a high degree of accuracy, achieving an R^2 of 0.96 and a root mean squared error (RMSE) of 0.38 µg/L for Chla, an R^2 of 0.97 and an RMSE of 1.81 Ppb for CDOM, and an R^2 of 0.95 and an RMSE of 0.52 NTU for turbidity. A robust time series for Chla, CDOM, and turbidity was generated using the XGBoost model, which was selected after a thorough evaluation of its predictive accuracy. To further analyze the temporal dynamics of water quality, generalized additive models were employed to examine trends and seasonal patterns in the data. The analysis revealed significant spatiotemporal variability in water quality parameters across the WMS. Chla concentrations showed clear seasonal peaks during the summer months, likely driven by nutrient availability, increased temperatures, and light levels, all of which promote phytoplankton growth. In contrast, CDOM levels were predominantly affected by freshwater inflows from rivers and rainfall, with higher concentrations observed during periods of heavy precipitation, while turbidity variability was shaped by these freshwater inputs in combination with wind-driven sediment resuspension. This study demonstrates the potential of integrating ML techniques with remote sensing data to enhance the monitoring and prediction of water quality in coastal and estuarine environments. By providing a detailed understanding of the temporal and spatial variability in water quality, the findings offer valuable insights into the impacts of climate change, human activities, and natural processes on aquatic ecosystems. This research contributes to coastal management by enhancing understanding of water quality dynamics, helping to inform strategies to mitigate the effects of climate change and human activities.

Presenter: Shaibal Ahmed

Presentation Session: AO5

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Qingmin Meng, Associate Professor, Department of Geosciences

Title: Advancing Soybean Yield Forecasting: Comparing Statistical and Machine Learning Techniques with Sentinel-2 Data

Abstract: Accurate crop yield estimation is vital for effective agricultural resource management, yield optimization, and economic planning. Remote sensing techniques, particularly using Sentinel-2 imagery, provide a powerful, non-invasive method for monitoring crop health and predicting yield. This study analyzed the predictive capabilities of spectral bands and vegetation indices for soybean yield during the 2018 growing season, focusing on key growth stages from May to September. Results revealed that spectral bands, including Band 6 and NIR1, consistently outperformed vegetation indices in predicting yield, especially during critical reproductive phases, such as flowering and seed filling. Vegetation indices like EVI and LSWI exhibited moderate predictive strength during vegetative stages but declined in utility during later growth stages. Stepwise regression identified optimal predictors for each growth stage, achieving high R^2 values (up to 0.84) with simplified models retaining strong explanatory power. While machine learning methods such as Random Forest provided comparable performance, they did not surpass the accuracy of stepwise regression. These findings underscore the importance of selecting predictors aligned with crop growth stages and highlight the superior capability of spectral bands in yield prediction, offering valuable insights for precision agriculture and sustainable crop management.

Presenter: Bhavana Gubbi Prakash

Presentation Session: AO5

Level of Study: Master's

Department: Civil and Environmental Engineering

Category: Engineering

Advisor: Dr Ramirez Avila, John, Civil and Environmental Engineering

Title: Assessing Sediment Sources: Temporal Variation Analysis of Suspended Sediments (1983-2005)

Abstract: The work investigates the temporal dynamics of sediment transport in the Rio Grande de Lo´ıza watershed with data ranging from 1983 to 2005, with a special focus on the evolution of the Q-Qs relationship in three periods: the 1980s, 1990s, and 2000. Applying sediment rating curves and hysteresis analysis, it gives evidence of striking temporal non stationarities in the efficiency of sediment transport, with a strong nonlinear response during the 1990s, whereas relatively weaker correlations were found for the 1980s and 2000. Such changes likely reflect changes in hydrology, sediment supply, and channel morphology that influence sediment dynamics. Results highlight the contribution of natural and anthropogenic factors, such as land-use changes, climate variability, and hydrological regimes, to decade-scale modulations of sediment transport processes. The present study has pointed out the complexity of the interactions governing sediment dynamics and provides an insight into sustainable watershed and sediment management strategies that balance ecological preservation with human demands.

Presenter: Md Masiat Roushan Masrafee

Presentation Session: AO5

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Hussein Gharakhani, Agricultural and Biological Engineering

Title: Enhancing Precision Agriculture with AI: Deep Learning-Based Cotton Weed Classification

Abstract: The integration of artificial intelligence (AI) into autonomous agricultural systems is revolutionizing precision agriculture, addressing critical challenges such as weed management. Effective weed classification is essential for improving crop yield and reducing reliance on manual labor and chemical interventions. This study explores the application of deep learning models for classifying cotton weeds, utilizing the WeedID10 dataset, which comprises 3,578 images of ten distinct weed species. Four models—basic sequential neural network, ResNet50, ResNet101V2, and EfficientNet-B0—were evaluated based on their ability to achieve high accuracy and robustness. Experiments were conducted to optimize learning rates, determine the best training epochs, and implement advanced strategies to enhance model performance.

One of the major challenges was the imbalance in the dataset, which was addressed through targeted augmentation, class weighting, and adaptive learning rate strategies. Among the evaluated architectures, EfficientNet-B0 emerged as the most effective model, achieving a test accuracy of 97.56%. Its minimal errors, rapid inference speed, and computational efficiency make it suitable for real-time field applications, such as autonomous robotic weeders and precision sprayers.

This study demonstrates the potential of AI and deep learning technologies in automating weed classification, providing a sustainable solution to modern agricultural challenges. The findings contribute to the growing field of AI-powered autonomous systems, emphasizing their role in enhancing productivity, reducing environmental impacts, and supporting the global movement toward sustainable farming practices.

Presenter: Rideeta Islam Aishy

Presentation Session: AP1

Level of Study: Master's

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hasan C. Tekedar, Assistant Research Professor, Department of Comparative Biomedical Sciences

Title: Evolutionary Insights into Colistin Resistance and Fitness Costs in Edwardsiella ictaluri

Abstract: Background: Aquaculture is vital for global fish production which faces significant challenges from infections caused by various pathogens, commonly treated with antibiotics. While initially effective, antibiotics often lose efficacy due to misuse and overuse, leading to the emergence of multidrug-resistant (MDR) pathogens. These genes spread and persist in environments, emphasizing the importance of understanding resistance evolution. Adaptive Laboratory Evolution (ALE) offers a valuable approach to study resistance mechanisms in controlled laboratory environments mimicking environmental conditions. We developed an ALE model utilizing Edwardsiella ictaluri 93-146, a gram-negative bacterium causing enteric septicemia in channel catfish, to investigate colistin resistance evolution.

Methods: We first determined the minimum inhibitory concentration (MIC), resulting at 100 µg/ml. Four independent biological replicates of E. ictaluri 93-146 were exposed to increasing doses of colistin, with controls remaining unexposed to account for random mutations. Exposed replicates were monitored over four passages at each concentration to stabilize any new mutations, reaching over 324x of MIC. Genome sequencing was performed on both evolved replicates and controls to identify genetic changes.

Results: Genome sequencing revealed a 46,504 bp loss in the genome of the exposed replicates, including complete loss of a secretion system; this portion of the genome was present in the control isolates, indicating these losses maybe result from colistin selective pressure. Several Single Nucleotide Polymorphisms (SNPs) were identified in the exposed replicates. After our result, two specific genes were identified at both sides of the deleted region. We hypothesize that they may be contributing to this large deletion. To validate, we created in-frame deletions of these genes and are repeating ALE on the mutants to evaluate their roles.

Conclusion: Our study highlights ALE's effectiveness understanding antibiotic resistance mechanisms, with comparative genomic analysis to understand key genetic alterations driving resistance.

Presenter: Luke A. Ferguson

Presentation Session: AP1

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. K. P. Poudel, Associate Professor of Forest Biometrics, Department of Forestry

Title: Generalized aboveground biomass equation for eastern cottonwood

Abstract: Alternative and environmentally friendly energy sources are becoming increasingly important to mitigate the adverse effects of climate change exacerbated by fossil fuel extraction and use. One such alternative is the use of short-rotation woody crops (SRWCs) for woody biomass for energy generation. SRWCs produce clean alternative sources of energy and plantations can mitigate atmospheric carbon through carbon sequestration. Eastern cottonwood (Populus deltoides Bartr. ex Marsh) is one such SRWC that has garnered a lot of attention and has been extensively studied. Eastern cottonwood has short rotation periods, and it can coppice regenerate, cutting down on potential replanting costs. For large-scale bioenergy production using SRWCs, tools must be produced that allow for accurate estimation of aboveground biomass and therefore, prediction of yields. While aboveground biomass equations have been developed for eastern cottonwood, most of them are localized and cannot be used everywhere. To this end, this study aimed at developing a generalized aboveground biomass equation for eastern cottonwood that can be used across multiple regions. A modified meta-analysis was used by compiling existing aboveground biomass equations for eastern cottonwood from multiple studies to generate aboveground biomass pseudodata and finally, deriving a final biomass equation by fitting models to the pseudodata using regression analysis. The models were then evaluated using criteria such as bias and root mean square error. New models will simplify the process of producing accurate estimates of aboveground biomass for eastern cottonwood and expand the pool of SRWC aboveground biomass equations.

Presenter: Jianing Liang

Presentation Session: AP1

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Courtney Siegert, Professor, Department of Forestry

Title: Comparative Analysis of Soil Nitrogen Mineralization and Nitrification in Hardwood and Softwood Afforestation in the Southeast US

Abstract: Understanding nitrogen mineralization and nitrification in afforested soils is crucial for optimizing the ecological benefits of afforestation, as these processes regulate soil carbon and nitrogen cycling, greenhouse gas emissions, and overall ecosystem functioning. In this study, we investigated net nitrogen mineralization (NH_4^+-N) and nitrification (NO_3^--N) rates in Conservation Reserve Program (CRP) hardwood and softwood stands of varying ages across six Major Land Resource Areas (MLRAs). Our findings revealed significant differences ($p < 0.05$) in all measured soil properties across MLRAs. However, while net NH_4^+-N varied significantly among regions ($p = 0.041$), net NO_3^--N did not ($p = 0.081$). Additionally, net NH_4^+-N differed significantly between hardwood and softwood stands ($p < 0.01$), whereas net NO_3^--N showed no significant variation between the two afforestation forest types. Net soil N nitrification and mineralization exhibited weak correlations with tree height, DBH, basal area, LAI, and litter depth, though stand age influenced these processes differently in hardwood and softwood forests. Random forest analysis identified soil texture, pH, total soil carbon, and clay content as the primary drivers of net NO_3^--N, while total soil carbon and total soil nitrogen were the most significant contributors of net NH_4^+-N. These findings highlight the complex interactions between forest, soil properties, and nitrogen cycling processes, offering insights into soil nutrient dynamics in afforested ecosystems.

Presenter: Sydney O'Donald

Presentation Session: AP1

Level of Study: Master's

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hasan Tekedar, Assistant Research Professor, Comparative Biomedical Sciences

Title: Investigating the role of Double-Crested Cormorants in aquaculture bacterial pathogen transmission through Hi-C sequencing

Abstract: Background: The Double-crested Cormorant (Nannopterum auritus) is a piscivorous bird endemic to North America, occupying habitat near bodies of water and coastal areas. They are a social species capable of forming large groups that migrate, roost, and feed together. Evidence suggests that Double-crested Cormorants heavily utilize aquaculture ponds as a food source during migration and wintering. Catfish farms in the Southern United States have experienced significant losses due to cormorant depredation during their wintering season. Often perceived as a nuisance species due to their intense foraging habits, practices and non-lethal management have been implemented to deter these birds from aquaculture ponds, with relatively little success. Predation by Double-crested Cormorants is an extensive threat to Mississippi catfish production through fish losses and major income deficits; however, another risk lies within the cormorants' potential to introduce pathogens into food-fish production particularly when habitats include receiving waters impacted by urbanization. While Double-crested Cormorant behavior and pond usage have been widely investigated, few studies have explored the birds' potential for spreading bacterial diseases in the aquaculture setting and beyond. Methods: Fecal samples from two Double-crested Cormorants were analyzed through Phase Genomics' ProxiMeta™ Hi-C method via proximity ligation and high throughput sequencing. The identified genomes were annotated through RAST and run against the VFDB database, CARD database, and PHASTER to assess virulence factors, antibiotic resistance, and phage elements. Results: It was revealed that several enteric pathogens resided within the GI tract of each bird. Bacterial species such as Edwardsiella tarda, Plesiomonas shigelloides, and Clostridium spp. were of particular interest given their zoonotic potential. Several of the known pathogens had hits for antibiotic resistance genes, with Edwardsiella tarda having the most across a wide spectrum of antibiotics. Conclusion: There is evidence to suggest that piscivorous birds could serve as vectors in the transmission of pathogens, such as Edwardsiella spp., to aquaculture settings. Moreover, the risk exists for antibiotic resistance genes to be introduced and transferred to environmental bacteria with zoonotic potential, posing a risk not only to fish but also to humans and other animals.

Presenter: Fenny Patel

Presentation Session: AP1

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hasan Tekedar, Assistant Research Professor, Forest Resources and Veterinary Medicine

Title: Investigating the Antimicrobial Resistance Evolution of Edwardsiella piscicida to Florfenicol

Abstract: Edwardsiella species, members of the Enterobacteriaceae family, are zoonotic pathogens that infect a range of hosts, including reptiles, fish, and humans. One such pathogen, *Edwardsiella piscicida*, causes enteric septicemia in catfish, leading to significant economic losses and food safety concerns due to high mortality rates. Florfenicol is commonly used to combat this pathogen, but the overuse of antibiotics raises concerns about antimicrobial resistance (AMR). To explore the development of AMR in *E. piscicida* and its underlying mechanisms, we employed Adaptive Laboratory Evolution (ALE), a method that simulates molecular evolution under controlled selective pressure. In this study, we exposed *E. piscicida* C07-087 to gradually increasing concentrations of florfenicol and evaluated both genotypic and phenotypic changes. The minimum inhibitory concentration (MIC) of florfenicol was determined to be the level that inhibited 90% of bacterial growth. Four replicate cultures were exposed to increasing florfenicol concentrations, while control groups were maintained in brain-heart infusion (BHI) medium. After completing the ALE circuit, the evolved isolates exhibited a 768-fold increase in florfenicol resistance, reaching an MIC of 549.88 µg/ml. Although these isolates showed reduced growth rates and smaller colony sizes compared to controls, genomic analysis revealed a significant DNA fragment loss in the evolved strains. These findings highlight the genetic mechanisms involved in florfenicol resistance and underscore the potential of ALE to uncover adaptive processes. This study contributes valuable insights into AMR and suggests strategies for more sustainable infection management in aquaculture.

Presenter: Daniel Egerson

Presentation Session: AP2

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Kristine O. Evans, Associate Professor, Wildlife, Fisheries and Aquaculture

Title: Enhancing Landowner Engagement in the U.S. Conservation Reserve Program: Exploring the CRP Menu Tool to Support Informed Decision-Making

Abstract: The Conservation Reserve Program (CRP) aims to enhance wildlife habitats, improve water quality, sequester carbon, and promote soil health, but knowledge barriers have long hindered landowners' ability to maximize these benefits. Persistent informational gaps and decision-making uncertainties often lead to conservation practices that conflict with local ecological contexts and yield suboptimal outcomes. This study addresses these challenges by identifying stakeholder expectations and developing a CRP Menu Tool to enhance decision-making. Using a mixed-methods approach, data were collected from 91 landowners and 145 practitioners through surveys and group discussions conducted during 12 physical and 3 virtual workshops across pilot states—Mississippi, Missouri, and Illinois. Stakeholders expressed the need for a tool that facilitates exploration of conservation practices, payment rates, enrollment updates, management requirements, and land eligibility assessments. Addressing these expectations, the CRP menu Tool was developed. The tool provides landowners with clarity on the CRP, allowing them to explore practices and simulate scenarios aligned with their personal and environmental priorities. Over 80% of stakeholders agreed the CRP Menu Tool effectively supports understanding of the CRP. The tool has since expanded to additional states, including Indiana, Iowa, and Ohio, with potential for nationwide implementation.

Presenter: Muhammad Hamza

Presentation Session: AP2

Level of Study: PhD

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hassan El Barbary, Professor, Department of Sustainable Bioproducts

Title: Nano-cellulose derived aerogel for removal of PFAS contaminants from water

Abstract: Per- and polyfluoroalkyl substances (PFAS) are emerging forever contaminants. Many chemical adsorbents have been used so far for their removal, but we focused on making green adsorbent from nano-cellulose. Aminated-cellulose nanofiber/deacetylated chitin (Am-CNF/DAC) composite aerogel was synthesized using cellulose nanofiber (CNF) and deacetylated chitin (DAC) in the presence of the chemical crosslinker epichlorohydrin (EPH) followed by amination using triethylammonium chloride (TEA). Different variants of aerogel synthesized using varied amounts of CNF and DAC were characterized using Fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), N2 adsorption-desorption isotherm, elemental analysis, and conductometric titration. Am-CNF/DAC (2:1) composite aerogel was used for the removal of perfluorooctane sulfonate (PFOS) because of its high amine content (0.598 mmol/g), high surface area (35.56 m^2/g), and better crosslinking as compared to other variants. Adsorption kinetic studies were performed at pH 5.1, although maximum adsorption was given over a wide range of pH. The data obtained was best fitted for second-order kinetics with the maximum adsorption value of 99 mg/g with an equilibrium time of less than one minute. Adsorption isothermal studies were best fitted with Langmuir non-linear fit at 15, 30, and 45°C with the maximum adsorption value of 703.76 mg/g at 45°C. These results show that Am-CNF/DAC composite aerogel is green, sustainable, and cost-effective, having a greater ability to remove PFAS contaminants from water.

Presenter: Tyler Redman

Presentation Session: AP2

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Michael Sandel

Title: The effects of hydrologic connectivity on bacterial dispersion in stream networks using eDNA detection

Abstract: Waterborne infectious diseases represent an ongoing challenge to human and animal health. With the current lack of effective predictors of microbial dispersal in freshwater ecosystems, partly due to the unique, dendritic geometric complexity of stream networks, further insight into this phenomenon is required. This study investigates the effects of hydrologic connectivity on bacterial dissemination within stream networks using a hierarchical analysis of bacterial community composition within the Noxubee River watershed of Mississippi. By employing environmental DNA (eDNA) detection methods, we will develop a comprehensive stream network model to assess the relative abundance of bacterial communities in conjunction with the National Water Model (NWM). Thereby, the inclusion of hydrologic data will be leveraged alongside bacterial relative abundances to determine the spatio-temporal factors contributing to microbial dispersion. This study encompasses 54 sampling sites within a 200 km^2 area, representing a stratified survey of the Noxubee Watershed. eDNA metabarcoding will facilitate the analysis of alpha and beta diversity to identify trends along the Noxubee Watershed. Leveraging the fractal geometry of stream networks will enhance the understanding of self-similar patterns and their influence on the movement and coalescence of microbial communities across varying spatial scales. The possibility of the broad application of these predictive mechanisms will subsequently be tested through the comparison between the Noxubee River model and the Wind River Watershed, Wyoming. Thus, the deliverables of this study represent an enhanced understanding of microbial dynamics within freshwater ecosystems and the improvement of management strategies for mitigating the impacts of waterborne pathogens.

Presenter: Damilola Taiwo

Presentation Session: AP2

Level of Study: PhD

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Gwendolyn Boyd-Shields

Title: Testing the efficacy of biopesticide compounds in guayule resin on southern pine beetle

Abstract: The use of synthetic pesticides for the control of southern pine beetle has been identified as a cause of build-up of resistance, in addition to the persistent environmental impacts of synthetic pesticides. Presently, silvicultural approach is the only methods of controlling southern pine beetles. In this study, guayule resin was tested as a control for southern pine beetle because guayule resin consists of biopesticide compounds that have been found to be effective against insect pests, including beetles, termites, and cockroaches. These biopesticide compounds include guayulins A-D and partheniol, which are grouped as sesquiterpenes, and argentatins and incanilin, which are grouped as triterpenoids. This study encompasses solvent extraction, characterization, and isolation of fractionations from guayule resin. Preliminary laboratory tests compared the dissolving strengths of acetone, hexane, and dimethyl sulfoxide on guayule resin. In the experiment, 20 ml of each solvent was tested with varying measures (0.25, 0.5, 0.75, and 1 g) of guayule resin. The resin and solvent were stirred together with a stirring crucible on a stirrer, with low heat applied when necessary to aid in dissolving the mixture. The time taken for a homogeneous mixture was recorded and compared across the solvents. Acetone dissolved the resin in less than fifteen minutes for all resin quantities, while dimethyl sulfoxide was slower at dissolving the resin. The preliminary results indicate that acetone was more effective than both dimethyl sulfoxide and hexane in dissolving guayule resin, which is important for characterizing guayule resin and testing its efficacy on southern pine beetle.

Presenter: Mohan Kumar Bista

Presentation Session: AP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli

Title: Characterizing Cotton Cultivars for Heat Stress Tolerance During the Reproductive Stage

Abstract: Introgression of physiological traits into high-yielding genotypes has been proposed to improve cotton yield and quality under heat stress. Comprehensive studies on physiology, reproductive organs, and yield components under heat stress during the reproductive stage are limited. In this study, heat stress-induced trait profiles of sixteen upland cotton cultivars were explored under current (32°C, control- CNT) and future growing temperature (36°C, heat stress - HS) conditions during the reproductive stage. Germination of pollen grains under HS was significantly reduced by 71% across cultivars compared with CNT. All cultivars employed a mechanism of transpirational cooling by increasing stomatal conductance and transpiration by 99% and 116%, respectively, under HS, compared with CNT. However, tolerance to HS in vegetative and reproductive traits was not observed in every cultivar. Heat stress-induced poor resource partitioning towards reproductive organs. Cultivars with a comparable number of bolls and seeds between CNT and HS did not necessarily maintain comparable seed cotton yields. On average, seed cotton yield and its component lint yield were reduced by 19% and 26% under HS compared with CNT. However, seed yield did not show a significant decline under HS, indicating a disproportionate reduction in intra-boll components. Both seed oil content and fiber quality traits, except fiber uniformity, were significantly reduced by HS with no trade-off between them in any cultivars. Overall, cultivars displayed differential tolerance to heat stress conferred by differential trait profiles. These results suggest that the complex interaction between genotypes, traits, and heat stress might be crucial for selecting parents in physiological breeding.

Presenter: Alekhya Chakravaram

Presentation Session: AP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa

Title: Genetic loci underlying physiological and agronomic traits revealed by GWAS in soybean

Abstract: Soybean (Glycine max) is a crucial global crop valued for its high protein and oil content, serving as a key resource for food, animal feed, and various industrial applications. As global demand rises and climate change poses increasing challenges, understanding the genetic basis of essential morphological traits has become increasingly important. This study utilized genome-wide association studies (GWAS) to identify significant genetic loci linked to key physiological and agronomic traits in soybean. GWAS analysis was conducted on a diverse panel of 227 soybean accessions using 41,985 high-quality single nucleotide polymorphisms (SNPs) with the BLINK model. A total of 19 significant SNPs were identified, associated with traits such as flavonol index (FlvM), nitrogen flavonol index (NFI), photosystem II efficiency (PhiPS2), electron transport rate (ETR), and biomass. Additionally, nine candidate genes were identified near 10 SNPs, including genes involved in DNA repair, intracellular transport, and photosynthesis. Key findings include Glyma.06G204000, linked to stress tolerance; Glyma.14G021800, essential for ascorbate biosynthesis and photosynthesis; and Glyma.19G103550, associated with chromatin remodeling. Moreover, four genes related to NFI were identified, including Glyma.02G065600 for DNA repair and Glyma.11G113000 for intracellular transport.

Presenter: Edirisa Juniour Nsubuga

Presentation Session: AP3

Level of Study: PhD

Department: Biochemistry, Nutrition, and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Joel J. Komakech; Assistant Professor; Department of Biochemistry, Nutrition, and Health Promotion

Title: Gender-Specific Interactions Between Obesity, Alcohol Consumption and Salivary Stress Biomarkers Among College Students in United States

Abstract: Objectives: This study investigated the relationship between obesity measures, alcohol intake and salivary α-amylase activity and cortisol levels across gender groups in college students.

Methods: In this cross-sectional study of college-aged students, participants (n=190) completed the NIH Diet History Questionnaire II. Body composition was measured via Bioelectrical Impedance Analysis. Salivary α-amylase activity was assessed using the Salimetrics α-amylase kinetic enzyme assay kit, while cortisol levels were determined using the salivary cortisol enzyme immunoassay kit. Multivariable regression analyses explained the effects of the interaction of alcohol consumption by BMI on α-amylase and cortisol activity. Significance was set at $p<0.05$.

Results: The students' mean age was 20±2.6 years, with a bodyweight distribution of 38% overweight/obese, 54% normal weight, and 8% underweight. Among students with overweight and obesity, each unit increase in alcohol consumption was associated with a 1.52-unit increase in salivary α-amylase activity ($p=0.030$). Sex-stratified analysis revealed that this relationship was driven by females only, where each unit increase in alcohol consumption was associated with a 2.24 unit increase in salivary α-amylase activity ($\beta=2.24$, $R2=0.16$, $p=0.012$) in the overweight/obesity group, with no significant effect observed in males. No significant interaction between BMI and alcohol consumption was detected for cortisol levels. However, among male students only, significant main effects were observed for African Americans ($\beta=0.22$,$R2=0.39$,$p=0.020$) and overweight/obese status ($\beta=-0.19$, $R2=0.39$, $p=0.025$) on cortisol levels.

Conclusion: Stronger associations in females for salivary α-amylase and distinct cortisol patterns in males suggest sex-specific patterns in alcohol consumption and stress biomarkers among college students with obesity.

Presenter: Sujan Poudel

Presentation Session: AP3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli, Assistant Professor, Plant and Soil Sciences

Title: Effects of Reduced Irrigation on Cowpeas: Plant Health, Leaf Reflectance, and Growth

Abstract: Cowpea is a vital legume crop known for its nutritional value and adaptability to diverse growing environmental conditions. While recognized for its resilience to abiotic stressors, decreased soil moisture during the early node and root development can significantly hinder resource uptake, growth, and yield potential. To address this gap, we evaluated the impact of water deficit (WD) on root and shoot characteristics in 15 diverse early-maturing cowpea genotypes during the early vegetative stage. Our findings revealed that WD significantly reduced stomatal conductance, the quantum efficiency of photosystem II ($P < 0.01$), and increased canopy temperature by 3 °C. Stressed plants showed a marked decrease in chlorophyll and nitrogen-flavonol index. These physiological and biophysical changes led to significant alterations in morphological traits, resulting in a 28% reduction in leaf numbers and a 38% decrease in node numbers. Furthermore, spectral analysis indicated significant changes in vegetation indices such as modified photochemical reflectance index and carotenoid reflectance index 1 ($P < 0.05$ to $P < 0.001$), reflecting shifts in leaf biochemistry in response to drought. We observed a significant increase ($P < 0.001$) in the root-to-shoot weight ratio, suggesting an adaptive mechanism to enhance water uptake and optimize growth under drought conditions. This study highlights physiological and morphological adaptations to drought stress during the branching and node formation stage.

Presenter: Dylan Williams

Presentation Session: AP3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Jagman Dhillon

Title: Optimizing agricultural practices: synergistic effects of rotations, tillage, cover crop, and nitrogen

Abstract: Increasing water productivity, soil carbon, and sustainability of croplands is imperative for the future of agricultural economy and overall farm success. However, most studies are limited by the number of parameters tested within a field experiment. Therefore, the objective of this study is to determine the long-term impact of multi-factor experiment initiated in Scott, Mississippi testing combinations of cover crops, crop rotation, nitrogen (N), and tillage on crop productivity and environmental sustainability. The experiment was set up in a split-split plot design, where the main plot factors were conventional till and strip till, the sub plot factor was with and without cover crop, and the sub-sub plot was four rotations. The four-rotations tested included continuous corn, continuous cotton, corn-cotton and cotton-corn, where all the phases of the rotation were present in each year, and each rotation received either a farmer recommended nitrogen rate or an additional 67 kg N ha-1. The sub-sub plots were replicated three-times and individual plots were 12 rows wide and 36.5 m long. In 2023, none of the factors affected corn yield, whereas cotton seed yield was influenced by a three-way interaction between cover crops, tillage, and N application. Where yield significantly reduced with application of additional N, in conventional tillage under no cover crop. In 2024, corn yield was significantly lower in strip till systems compared to conventional tillage, whereas no differences were found with or without cover crop or crop rotation. Cotton seed yield was lower in cotton-corn rotation in comparison to continuous cotton, whereas no differences were found with tillage or cover crops.

Presenter: Mohammed Omar Sahed Chowdhury

Presentation Session: AP4

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Padmanava Dash, Associate Professor, Department of Geosciences

Title: Estimation of Carbonate System Parameters over an Oyster Reef using Unmanned Aerial Systems (UAS) imagery and Autonomous Surface Vessel (ASV) Data

Abstract: Ocean acidification, driven by atmospheric CO2 absorption, differs from coastal acidification, which is influenced by nutrient runoff, freshwater input, and natural processes like decomposition. This study aimed to estimate carbonate system parameters using unmanned aerial systems (UAS) and autonomous surface vessel (ASV) data over an oyster reef in the Western Mississippi Sound (WMS). Field campaigns in June, July, and September 2021 collected high-resolution multispectral imagery via a MicaSense Rededge MX sensor on an Inspire-2 drone, alongside ASV-deployed in situ data, including total alkalinity (TA), partial pressure of carbon dioxide (pCO2), sea surface temperature (SST), salinity (SSS), colored dissolved organic matter (CDOM), and chlorophyll-a (Chl-a). A random forest algorithm produced the best models for estimating TA and pCO2 using SSS and Chl-a, with high R2 values (0.919 for TA, 0.936 for pCO2), low RMSE (974.8 µmol kg-1 for TA, 40.4 ppm for pCO2), and low %RMSE (20.17% for TA and 9.71% for pCO2). CDOM and SSS maps were generated, with a strong linear correlation (R2 = 0.948) between salinity and CDOM. Chl-a maps were produced using a pre-existing Chl-a algorithm. Time-series maps of TA and pCO2 were generated over the oyster reef using UAS-derived Chl-a and SSS images. The study demonstrates the effectiveness of UAS in monitoring TA and pCO2 in coastal systems, offering high spatial resolution. These maps can estimate additional carbonate parameters like aragonite saturation, pH, and dissolved inorganic carbon, providing insights into spatial and temporal variability.

Keywords: UAS, ASV, Random Forest, Carbonate system parameters.

Presenter: Allison Harvey

Presentation Session: AP4

Level of Study: Master's

Department: Geosciences

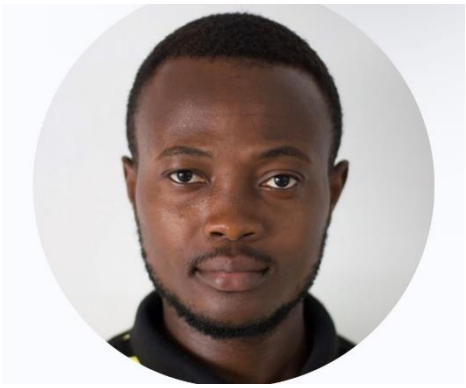
Category: Education, Arts and Sciences, and Business

Advisor: Dr. Michelle Saunders, Professor, Department of Geosciences

Title: Identifying How NWS Meteorologists Localize and Personalize Hazard-Specific Messaging for Core Partners

Abstract: Over the past few decades, the National Weather Service (NWS) has continued to improve impact-based decision support services (IDSS) efforts to strengthen communication with core partners. One proposed way to improve IDSS efforts is to provide NWS meteorologists with vulnerability data so they can better communicate who, what, and where is most at risk to weather hazards. The National Oceanic and Atmospheric Administration (NOAA) also seeks to understand how NWS meteorologists "personalize" and "localize" information regarding hazardous weather impacts to their core partners, including the communication of vulnerability data. This study addresses how a new spatially hazard-specific vulnerability tool called the Brief Vulnerability Overview Tool (BVOT) may impact how NWS meteorologists tailor messaging to their core partners.

The main objective of this study was to document and analyze how NWS meteorologist communicate/tailor hazard information to their core partners, especially Emergency Managers. Study methods included interviewing meteorologists from one of the three BVOT test offices for the research project. The interviews focused on each meteorologist's background in the weather service, their WFO and County Warning Area (CWA), communication and relationships with core partners, vulnerabilities in their CWA, and their initial ideas about how BVOT could be used in their WFO. By conducting a thematic analysis of interview transcripts, it was determined that relationship building and communication styles between meteorologists and core partners is essential.



Presenter: Joe Mensah

Presentation Session: AP4

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Professor Shrinidhi Ambinakudige

Title: Spatial Hotspot Analysis of Non-Communicable Diseases and Air Pollutants in the Lower Mississippi Valley: A GIS-Based Approach to Public Health Disparities

Abstract: The Lower Mississippi Valley (LMV) is a region characterized by significant environmental and health disparities, where the prevalence of non-communicable diseases and exposure to air pollutants pose serious public health concerns. This study employs Geographic Information System (GIS) techniques to conduct a spatial hotspot analysis of non-communicable diseases and air pollutants in the LMV, aiming to identify high-risk areas and explore potential correlations between disease prevalence and air pollutants. Using epidemiological data from the US Climate Vulnerability Index, hotspots analysis (Getis-Ord Gi*) was performed to detect clusters of disease outbreaks and pollution concentrations in LMV and the whole of the United States to compare their means. The findings reveal that geographic patterns of Adult Asthma positively correlated with black carbon and ozone. Additionally, there was a positive correlation between Adult Asthma, High Blood Pressure and Coronary Heart Disease. Also, the mean of Asthma for LMV was statistically higher than the national average. Diabetes also showed a statistically higher mean as compared to the national average. This study shows the importance of integrating geospatial analytics in public health surveillance, finding lasting solutions to disease burdens in LMV and making efforts to mitigate health risks associated with non-communicable diseases and air pollutants in LMV.

Presenter: Taylor F. Moore

Presentation Session: AP4

Level of Study: Master's

Department: Counseling, Higher Education Leadership, Educational Psychology, and Foundations

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Stephanie Mattson; Assistant Professor; The Department of Counseling, Higher Education Leadership, Educational Psychology, and Foundations

Title: Using Behavioral Skills Training to Teach Novice Behavioral Professionals Literature Searching Skills

Abstract: The field of Applied Behavior Analysis is based in the science of behavior analysis. As such, it is important to provide novice behavioral professionals who are learning to work with clinical populations with a strong foundation of literature searching skills. For behavioral professionals training in the university context, the university library system is a useful resource; however, library systems can be difficult to navigate efficiently for individuals who do not have explicit training and practice. In the current investigation, we used a non-concurrent multiple baseline across participants design to evaluate the effects of a remote behavioral skills training intervention on literature searching skills. Six students, three undergraduate and three graduate students, enrolled in a behavior analysis course sequence designed to prepare behavioral professionals to provide services to individuals on the autism spectrum participated in this study. Results indicated that following behavioral skills training, all participants navigated the library system and completed literature searching skills with better accuracy and more efficiently in the post-training condition.

Presenter: Georgia Starr

Presentation Session: AP4

Level of Study: Master's

Department: Kinesiology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Stamatis Agiovlasitis, Professor, Department of Kinesiology

Title: DOES A SWIMMING PROGRAM INCREASE SELF-EFFICACY IN INDIVIDUALS WITH INTELLECTUAL DISABILITY? A QUALITATIVE STUDY

Abstract: BACKGROUND: Short-term adapted swimming programs for individuals with intellectual disability (ID) may increase self-efficacy. Insight into this may be gained by examining the perspectives of stakeholders of such programs. PURPOSE: We investigated if an adapted swimming program improves self-efficacy in individuals with ID from the perspectives of the swimmers themselves, their parents, and the volunteering staff. METHODS: The program was conducted over 5 days (60 min · day-1) and targeted swim skill development and independence. A volunteer without disability supported each participant. After the program, we conducted semi-structured interviews with 5 swimmers (age 14-35 years; 4 females), 5 parents (age 40-70 years; 5 mothers), and 5 volunteers (age 17-64 years; 4 females). Interviews were audio-recorded and transcribed. Themes were extracted via open, structured, and focused coding. Rigor was ensured by preserving trustworthiness and authenticity. RESULTS: Parents and volunteers concurred that and self-efficacy increased in swimmers. Some responses by swimmers indicated improvements in self-efficacy. Emerging themes were consistent with Bandura's Self-Efficacy Theory (SET): (a) previous experience in the water; (b) vicarious experience from observing others; (c) social persuasion from peers; and (d) feedback from instructors. Additional themes were consistent with Self-determination Theory (SDT): (a) autonomy in aquatic activities; (b) competence by acquiring skills; and (c) relatedness with peers. All participants stressed the role of a supportive environment for increasing self-efficacy. CONCLUSION: A 5-day swimming program improves self-efficacy in individuals with ID from the perspectives of the swimmers, their parents, and volunteering staff. Themes were consistent with SET and SDT.

Presenter: Emmanuel Ankomah

Presentation Session: AP5

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Colleen N. Scott, Associate Professor, Chemistry

Title: Design and Synthesis of SWIR Probes for Bioimaging

Abstract: Shortwave infrared (SWIR) emissive probes have advantage inadvantage in biological sensing and imaging due to their long absorption and emission wavelengths. These SWIR emissive probes offer several advantages such as deep tissue penetration, reduced background fluorescence, and minimal cell damage. Among the many emissive dyes, classical xanthene-based dyes, fluorescein, and rhodamine, have unique structural and photophysical properties that enable them to be used as biosensors. Unfortunately, fluorescein and rhodamine cannot be used in deep tissue since their absorption and emission wavelengths lie within the visible range, which allows the light to scatter thus limiting penetration. Additionally, they have poor resolution due to the background fluorescence of biological samples in the visible window. . Consequentlywindow. Consequently, developing SWIR emissive probes based on xanthene dyes for application in deep tissue has become essential. Research in the Scott group focusfocuses on the design and synthesis of novel SWIR xanthene-based dyes for advancement in the field of biological sensing and imaging. The modification of the acceptor xanthene core with various conjugated donor molecules is a key aspect of our approach to lower the bandgap of the dyes. By using triflated or brominated xanthene cores as substrates and reacting them with different conjugated donor molecules, we have developed SWIR probes which have extensive application in bioimaging with molecular switching mechanisms . Interestingly, we have discovered that the directdirect arylation reaction is essential in the synthesis of our dyes. One notable advantage of these probes is their strong photoacoustic signal, which can be useful in imaging techniques, since they do not have good emission properties. Additionally, their biological compatibility and photostability make them suitable for long-term imaging and sensing applications. In this presentation we will reporreport t..... on a novel short-wavelength infrared (SWIR) dye (XanthEA) featuring an extended conjugated donor and a xanthene acceptor moiety. The dye is synthesized through a concise four-step process, which allows for efficient production. XanthEA exhibits a maximum absorption wavelength of approximately 950 nm, positioning it in the near-infrared (NIR-II) range. Given its strong absorption in the NIR-II region, XanthEA is expected to excel in deep tissue imaging, enabling clearer visualization of biological structures beneath the surface. This capability could greatly enhance techniques in medical diagnostics and research.

Presenter: Umesh Chandra Biswas

Presentation Session: AP5

Level of Study: PhD

Department: Computer Science and Engineering

Category: Engineering

Advisor: Dr. Maxwell Young, Associate Professor, Computer Science and Engineering

Title: Softening the Impact of Collisions in Contention Resolution

Abstract: Contention resolution addresses the problem of coordinating access to a shared communication channel. Time is discretized into synchronized slots, and a packet can be sent in any slot. If no packet is sent, then the slot is empty; if a single packet is sent, then it is successful; and when multiple packets are sent at the same time, a collision occurs, resulting in the failure of the corresponding transmissions. In each slot, every packet receives ternary channel feedback indicating whether the current slot is empty, successful, or a collision.

Much of the prior work on contention resolution has focused on optimizing the makespan, which is the number of slots required for all packets to succeed. However, in many modern systems, collisions are also costly in terms of the time they incur.

In this paper, we design and analyze a randomized algorithm, Collision Aversion Backoff (CAB), that optimizes both the makespan and the collision cost. We consider the static case where an unknown n>= 2 packets are initially present in the system, and each collision has a known cost C, where 1 <= C <= n^k for any constant k>= 0. With error probability polynomially small in n, CAB guarantees that all packets succeed with makespan and a total expected collision cost of O(n\sqrt{C} log^2 n). We give a lower bound for the class of fair algorithms: where, in each slot, every packet executing the fair algorithm sends with the same probability (and the probability may change from slot to slot). Our lower bound is asymptotically tight up to a poly(log n)-factor for sufficiently large C.

Presenter: Rishita Garg

Presentation Session: AP5

Level of Study: Master's

Department: Computational Engineering

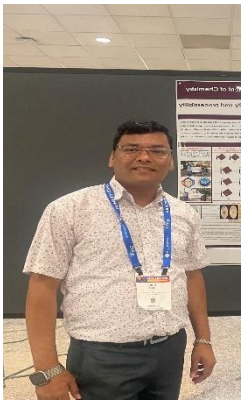
Category: Engineering

Advisor: Dr. Anup Zope, Center for Advanced Vehicular Systems

Title: Understanding the Phenology and Mapping of Needle Blight Disease in Loblolly Pines Across Mississippi

Abstract: Pine trees are a vital part of the ecosystem, as they help regulate the climate, support biodiversity, and provide renewable natural resources. However, a widespread threat to mature loblolly pines has emerged across the Southeastern United States, recently necessitating efficient monitoring strategies. This study uses remote sensing and GIS technologies to understand the phenology and spread of the disease across Mississippi over the years by analyzing the spatial and temporal aspects of pine trees. Sentinel-2 imagery was used to calculate the Green Chlorophyll Index (GCI) from 2019 to 2024 to analyze stress levels in pine trees. Supervised classification techniques were applied to delineate pine trees from other land-use classes. Integrating remote sensing and GIS tools provides a robust framework to monitor the disease across large areas with high efficiency, which can help forest managers tackle the problem more competently.

Presenter: Hari Giri



Presentation Session: AP5

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Colleen Scott, Associate Professor, Chemistry

Title: Modulating Conductivity, Redox Activity, and Optoelectronic Properties in Phenothiazine/Biphenyl Polyaniline Derivatives through Side-Chain Modifications

Abstract:

Polyaniline (PANI) is widely recognized for its tunable electrical properties, environmental stability, and cost-effective synthesis. However, its practical use in advanced technologies has been limited by poor solubility and restricted processability. In this study, we synthesized a series of novel phenothiazine/biphenyl-based polyaniline derivatives to enhance the electrochemical performance and processability of traditional PANI. By incorporating various electron-donating and electron-withdrawing groups through side-chain modifications, we successfully modulated the conductivity, redox activity, and optoelectronic properties of these derivatives. Comprehensive characterization was performed using techniques such as Proton Nuclear Magnetic Resonance (^{1}H NMR), Fourier Transform Infrared Spectroscopy (FTIR), Ultraviolet-Visible Spectroscopy (UV-Vis), X-ray Diffraction (XRD), Cyclic Voltammetry (CV), thermogravimetric analysis (TGA), Differential Scanning Calorimetry (DSC), and Scanning Electron Microscopy (SEM). The results demonstrate that side-chain engineering significantly impacts solubility, crystalline, conductivity, and electrochemical stability. These findings establish a basis for enhancing PANI derivatives for application in next-generation energy storage, sensors, and optoelectronic devices.

Presenter: Ander Talley

Presentation Session: AP5

Level of Study: Master's

Department: Computer Science and Engineering

Category: Engineering

Advisor: Dr. Adam Jones, Assistant Professor, Computer Science and Engineering

Title: Representing point clouds as compressed bitarrays

Abstract: 3D Deep Learning techniques suffer from a variety of computational restraints, primarily resulting from the representation of the data necessary to train a robust model. In order to train models efficiently, methods must be implemented to ensure data does not bloat the model, while

maintaining a significant structural similarity to the target after manipulating the data. Existing methods utilize down-sampling techniques to reduce 3D model sizes, but still prove to be too large even after significant compression. Our approach leverages inherent properties in point clouds to

maximize the compression of point clouds in a truly binary method, maintains significant structural similarity, and has dramatically increased the speed of deep learning tasks. We find that even after representing this data as single ones and zeros instead of "real values," our CNN-based model can still learn the features of these objects. We aim to show through this work that 3D Deep Learning can compete with 2D and 1D data spaces in terms of accuracy and computational resources.

Presenter: Katherine Kennedy

Presentation Session: AP6

Level of Study: Master's

Department: Animal and Dairy Science

Category: Agriculture and Life Sciences

Advisor: Dr. C. L. Lemley, Professor, Animal and Dairy Science

Title: Effect of Melatonin Supplementation on Fatty Acid Transport During Maternal Nutrient Restriction

Abstract: Nutrient restriction during the last trimester of gestation can lead to intrauterine growth restriction where nutrients able to cross the placenta are prioritized to fetal brain and nervous system development to preserve nervous function over muscular and immune development. Melatonin supplementation during the last 80 days of gestation has been hypothesized to increase placental fatty acid receptor gene expression to overcome the differences observed between nutrient restricted fetuses and fetuses fed proper nutrient requirements. In this study, 29 Brangus heifers were fed either 100% of NRC requirements (ADQ) or 60% of NRC requirements (RES) from day 160 to day 240 of gestation. Half of each group was supplemented with 20mg of melatonin resulting in four treatment groups (ADQ-MEL; ADQ-CON; RES-MEL; RES-CON). Maternal caruncle and fetal cotyledon expression SLC27A1 was increased ($P<0.05$) in nutrient restricted dams compared with adequate fed. Cotyledon CD36 and maternal SLC27A4 expression were increased ($P<0.05$) in nutrient restricted dams supplemented with melatonin. Maternal concentrations of total monounsaturated fatty acids and total omega-3s were increased in nutrient restricted dams compared with adequate fed. There are no differences observed in fetal branch chain fatty acids between control groups but when melatonin was supplemented, RES-MEL had lower concentrations due to 3,7,11,15-MEC16:0 absorption. Conversely, concentrations of C18:1c9 was increased in amnion fluid of RES-MEL offspring on day 240 compared with all other treatment groups. Maternal fatty acid concentrations were influenced by nutrient restriction while fetal and amnion fatty acid concentrations were significantly influenced by melatonin supplementation during nutrient restriction.

Presenter: Larry Leon-Medina

Presentation Session: AP6

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Leyla Rios de Alvarez, Animal and Dairy Sciences

Title: Analysis of seasonal, sex, and age group effects on weight and parasitic load in a Spanish goat herd in Mississippi

Abstract: Spanish goats, introduced to the United States in the 1500s, are a valuable meat breed, with most producers located in the southeastern region. This study evaluated the effects of season (S) [Autumn, Winter, Spring, Summer], sex (Ss) [male (M), female (F)], and age group (Ag) [adult (Ad), young (Yg)] on body weight (BW), body condition score (BCS), FAMACHA©, fecal egg count of nematodes (FEC, EPG), and coccidia (OPG) in a rotationally grazed herd of 24 registered Spanish goats supplemented with 13% CP commercial concentrate over one year (October 2023–2024). Data were analyzed using SAS 9.4 using a Mixed Model and Chi-Square for categorical variables. BW was significantly affected by S and Ag ($P<0.0001$). Goats weighed less in Winter (-9.73 kg, $P<0.0001$) and Spring (-3.47 kg, $P=0.0026$) compared to Autumn, while Summer BW increased (+6.06 kg, $P<0.0001$), likely due to higher forage biomass and pregnancy in Ad F. Ad goats were heavier than Yg (+24.18 kg, $P<0.0001$), but Ss had no effect ($P=0.6046$). EPG was lower in F than M (Estimate=-0.2691, $P=0.0076$), with no S or Ag effects. OPG varied by S and Ag ($P<0.0001$, $P=0.0189$), with Spring showing the highest values (Estimate=0.4409, $P<0.0001$). FAMACHA© and BCS were significantly associated with S, Ss, and Ag ($P<0.0001$). These results demonstrate that seasonality, sex, and age significantly influence weight and parasite load in Spanish goats, providing insights for improved management strategies.

Presenter: Maxwell Muriuki Mkunga

Presentation Session: AP6

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Leyla Rios, Assistant Professor, Animal and Dairy Sciences

Title: Preliminary Results of Manual vs. LiDAR Scan Measurements of Carcass Traits in Bovines: A Comparison.

Abstract: Precise carcass measurement is crucial for assessing meat yield and quality and enhancing genetic breeding programs. Traditional manual methods, while precise, can be time-consuming. New technologies like Light Detection and Ranging (LiDAR) scanning provide an effective non-contact option. By measuring the carcass length inside the vertebrae (CC), entire carcass length outside the carcass (WCL), front quarter (FQ), hind quarter (HQ), ribeye area (RBA), and backfat thickness (BFA), this study compared manual (M) and LiDAR (Li) methods. Two bovine carcasses, 660 lbs. and 636 lbs. respectively, were separated into the right and left sides eleven days after the slaughter at a temperature of 34°F. Measurements were obtained for (M) using a tape measure for the carcass lengths, a USDA grid ruler to assess the thickness of the backfat, and a USDA dot plastic grid to measure the ribeye area. LiDAR was used with the App for iOS System Polycam ® version 4.0.3 with an iPhone 14 Pro Max, scanning with infrared light to provide non-contact measurements by acquiring and analyzing 3D data of the carcass surface collected from 2 minutes of image recording, pointing around the carcass and Rib Eye. The differences between the two approaches were examined using a paired t-test with the software SAS 9.4. The results did not reveal any significant differences between M and Li. However, RBA measurements (73.54cm2 ± 2.41) (99.99cm2 ± 0) differed significantly ($p<0.0001$), suggesting that LiDAR accuracy may be limited for some parameters area and further validation is needed.

Presenter: Samrat Sikdar

Presentation Session: AP6

Level of Study: PhD

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. N. Osman, Assistant Professor, School of Human Sciences

Title: A scientific evaluation of a 4-H spring break “robotics” camp in Mississippi

Abstract: 4-H spring break camps intend to develop various life skills amongst the youths. It is important to evaluate how much effective these camps are. This study evaluated the program outcome or impact of the 4-H robotics camp as held in Union County of Mississippi during 2024 spring break. 3 Big “E” questions were generated as a part of this evaluation. The specific criteria, indicators and standards were also included in the extension evaluation to make the evaluation justified and meaningful. Criteria for Big E question 1 is “knowledge and skill reported by youth”. There are four criteria associated with Big E question 2 like "discussion with others about the camp" etc. The criteria associated with the Big E question 3 is "planning to use the information". The evaluation employed post-only design as the evaluation data was collected from the 4-H member participants only after the completion of the 4-H robotics camp. Data were collected directly from the participants on the last day after the completion of the camp. Around 86% of the respondents indicated that they learned some new things and gained new knowledge after attending this camp. Though 86% of the participants indicated that they want to attend future camps (which is above 80% as per the standard), the no. of responses for other 3 categories did not cross 80%. Less than 80% of the respondents indicated that they would use what they learned in this robotics camp, and this is below the standard as per the program standards.

Presenter: Trinity Baynham

Presentation Session: MO1

Level of Study: Master's

Department: History

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Peter Messer, Professor, History

Title: Words of War: How Misinformation Shapes Conflict and Forges Alliances Through History

Abstract: The 18th century was a pivotal era of interaction between European colonial powers and Native American nations, marked by the strategic use and misuse of information. As European powers vied for dominance in the Americas, misinformation became a powerful tool for both conflict and alliance-building. Misleading promises, exaggerated threats, and fabricated narratives were deliberately employed to manipulate perceptions and shape decisions, often with devastating consequences. For Native American tribes, misinformation spread by European settlers and rival tribes often disrupted traditional alliances, fomented distrust, and led to severe conflicts.

For Europeans, intelligence gathered from Native sources was frequently distorted to justify territorial expansion, dominance of trade routes, or military action. The French and Indian War illustrates how misinformation fueled tensions, as colonial powers misrepresented tribal loyalties and exaggerated enemy threats to rally support. Similarly, tribes such as the Cherokee and Iroquois Confederacy leveraged misinformation to protect their interests, forge temporary alliances, and resist encroachment.

This presentation explores the complex dynamics of information and misinformation during this period, highlighting its role as a double-edged sword that could incite violence while simultaneously creating unexpected alliances. By examining these historical patterns, we gain insight into the enduring power of information—and misinformation—in shaping geopolitical landscapes.

Presenter: Madison Bibbs

Presentation Session: MO1

Level of Study: PhD

Department: Psychology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Mitchell Berman, Professor and Assistant Dean for Graduate Academic Affairs, Department of Psychology

Title: Parental Internalizing Problems and Emerging Adult Emotion Regulation: Moderation by Gender

Abstract: Children of parents with high internalizing problems are at greater risk for developing psychological disorders. However, the link between recent parental internalizing problems and emotion regulation in emerging adults remains unclear. Since emotion regulation is central to adaptive and maladaptive functioning, this is an important gap in the literature. Additionally, gender differences in emotion regulation have been found for parents and their offspring. This study examined how perceived parental internalizing problems relate to emotion regulation in emerging adults, considering the gender of both parents and their children from cisgender households. University students (N = 488; 138 men, 350 women) completed measures of parental internalizing behaviors and self-reported emotion regulation. Analysis revealed that both mother and father internalizing behaviors were associated with their children's emotion regulation, regardless of gender. The findings highlight the need for further research on parental influence. Study limitations and clinical implications are discussed.

Presenter: Md Shahnewaz Hossain

Presentation Session: MO1

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Shrinidhi Ambinakudige, Professor, Geosciences

Title: Mapping Social Susceptibility to Climate Impacts in the Mississippi Delta: A Pathway to Environmental Justice

Abstract: The Yazoo-Mississippi Delta, a predominantly African American region, faces severe social challenges, including the highest poverty rates, poor health outcomes, low educational attainment, and high unemployment, all worsened by frequent climate impacts. This study aims to map hazard-specific social vulnerability in the Mississippi Delta to assess potential risk factors using the Global Delta Risk Index (GDRI) approach, which incorporates community's social susceptibility, coping capacity, ecosystem susceptibility, and robustness. The model will incorporate insights from community focus groups to identify social, structural, and institutional factors influencing climate impacts on marginalized Delta residents. Preliminary results reveal significant disparities in social susceptibility across neighborhoods, with some areas identified as high-risk hotspots. African American populations in these neighborhoods range from 13% to 98%, with a strong and significant correlation between African American population concentration and higher susceptibility scores. These findings highlight the uneven distribution of climate-related risks and provide a foundation for advancing environmental justice across the Delta.

Presenter: Sk Nafiz Rahaman

Presentation Session: MO1

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope, Department of Geosciences

Title: A Comparative Machine Learning Approach to Map Seasonal Groundwater Salinity Intrusion in the Mangrove Surrounded Coastal Regions of Bangladesh

Abstract: Salinity intrusion degrades drinking water quality and impacts health and agriculture, especially in Bangladesh's southwestern coastal region, home to the Sundarbans. This area experiences intensified salinity intrusion in wells, aquaculture, and farmlands, affecting farming communities. Although prior studies have addressed salinity intrusion, detailed mapping using advanced machine learning and remote sensing remains underexplored. This research employed Random Forest (RF) and Gradient Boosting (GBoost) algorithms to predict seasonal salinity intrusion and generate regional maps. We collected 40 groundwater samples during the wet season (September 2020) and another 40 during the dry season (May 2021) from selected wells. Field measurements of pH, oxidation-reduction potential (ORP), salinity, dissolved oxygen, and temperature were taken using advanced kits. Laboratory analyses determined major cations and trace elements via Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and measured anions through Ion Chromatography (IC). A custom algorithm in Google Earth Engine (GEE) extracted remote sensing salinity indices—including the Enhanced Vegetation Index (EVI), Weighted Difference Vegetation Index (WDVI), Salinity Index (SI), Tasseled Cap Wetness (TCW), and Normalized Difference Salinity Index (NDSI) from Sentinel-1 SAR and Sentinel-2 data. Fifteen remote sensing variables, including Land Use Land Cover (LULC), were incorporated into the models. For the wet season, the RF model achieved an R-squared of 0.517 and the GBoost model attained 0.536. For the dry season, the RF model reached 0.733 and the GBoost model 0.835. These moderately high-resolution maps are crucial for identifying vulnerable households and agricultural lands while guiding policy interventions.

Presenter: Emmanuel Somali

Presentation Session: MO1

Level of Study: Master's

Department: Classical and Modern Languages and Literature

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Keith Moser, Professor, French

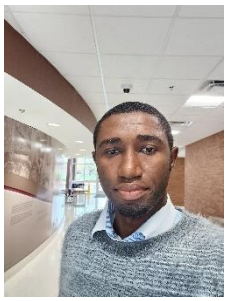
Title: Reforestation as a Remedy: Lessons from L'Homme qui plantait des arbres to Counteract Environmental Degradation from Galamsey in Ghana

Abstract: Galamsey and Its Environmental Consequences: Lessons from The Man Who Planted Trees

The environmental impacts of galamsey mining in Ghana have reached a critical point where biodiversity, water resources, and soil health have been grossly degraded. In The Man Who Planted Trees, Jean Giono's gentle yet powerful fable about the transformation of a desolate landscape into a teeming ecosystem over three decades, through the sole act of planting trees, gives a model for how sustained, small-scale effort can reverse degradation.

This presentation investigates how the lessons from Giono's story can inform and inspire local responses to the environmental degradation caused by galamsey. By focusing on reforestation and good land management, the long-term impact of mining practices can be reduced, with a consequent improvement in soil fertility, the protection of water resources, and the restoration of biodiversity.

It can form part of the key recovery strategies in Ghana from environmental degradation caused by galamsey, through community-led tree planting, which comes with ecological and economic benefits to the locals.



Presenter: Daniel Egerson

Presentation Session: MO10

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Kristine O. Evans, Associate Professor, Wildlife, Fisheries and Aquaculture

Title: Addressing Knowledge Gaps in the U.S. Conservation Reserve Program: Co-Developing the CRP Menu Tool to Improve Landowner Decision-Making

Abstract: The Conservation Reserve Program (CRP), a voluntary initiative by the U.S. Department of Agriculture, encourages landowners to retire agricultural lands temporarily, promoting environmental conservation by improving water quality, reducing soil erosion, and creating wildlife habitats. Despite its successes, participation barriers persist due to complex guidelines and limited access to decision-making resources. This study addresses these challenges by identifying knowledge gaps, understanding stakeholder expectations, and developing the CRP Menu Tool to enhance informed decision-making. Data collected from 91 landowners and 145 practitioners through surveys and workshops across Mississippi, Missouri, and Illinois highlighted significant knowledge disparities and generated 128 stakeholder comments that shaped the tool's development. The CRP Menu Tool includes three core features: CRP Basics, providing program details and eligibility criteria; Explore Practices, offering tailored conservation practice information; and Check Eligibility, utilizing geospatial features to visualize eligible properties and practices. The CRP Menu Tool has expanded to include other states, such as Indiana, Iowa, and Ohio, with the potential for nationwide adoption.

Presenter: Camren Fraser

Presentation Session: MO10

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Leandro E. Miranda

Title: Exploring an image-based approach to estimating weight and condition in fish

Abstract: Assessing body condition in juvenile fish can be challenging for various reasons. Condition often requires measuring body weight. However, the weight of small fish is difficult to measure in the field since it requires precise and accurate instruments. This difficulty is compounded by rocking boats, wind, and other unsuitable conditions. Body fat-based metrics can be obtained using numerous instruments including the Distell fatmeter, bioelectrical impedance and Fourier transform near-infrared spectroscopy. These have proven to be effective on various species but are not likely to work as well on juvenile fish that typically have low fat content. An alternative way to measure body condition in fish is by using body morphometric measurements to describe the general shape of the fish. Deeper and more rotund fish are generally heavier and thus could be assumed to be in better condition. I plan to use image based morphometric techniques to estimate body weight and in turn condition in a variety of juvenile fishes across the Mississippi River Basin. This condition estimation technique will potentially serve as an alternative to traditional weight measurements that fisheries managers can apply to a wide range of species and needs. I review various methods for estimating condition and, as a pilot study, apply an image-based approach to a pre-existing dataset.

Presenter: Haley Hughes

Presentation Session: MO10

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. J. Brian Davis, Professor, Wildlife, Fisheries, and Aquaculture

Title: Native Bee Response to Mechanical and Hydrologic Manipulations and Red Imported Fire Ants in Seasonal Wetlands

Abstract: Seasonal wetlands help meet the biological needs of various autumn migrating and wintering waterfowl species in southern United States. Management of seasonally flooded impoundments often uses soil and vegetation disturbances to promote early succession plants that produce abundant seeds for foraging birds. Native bees (Hymenoptera: Apoidae) and red imported fire ants (Solenopsis invicta; RIFA) also occupy these wetland habitats, however, how these insects are affected by water and vegetation manipulation is understudied. We designed an experiment on several areas including Panther Swamp and Sam D. Hamilton Noxubee National Wildlife Refuges, and private lands in Mississippi. We identified twelve wetland sites and created 10-acre plots, subdividing them into two 5-acre plots. We randomly assigned wetland management methods that included either a disking, mowing, flooding, or control treatment to each of the 5-acre plots, ensuring equal representation. We established bee bowls, blue vane traps, and nest traps throughout the 5-acre plots to evaluate native bee community abundance and responses to each of the assigned managements. We are also evaluating native bee community responses to the presence of RIFA. Six of the twelve 10-acre sites were treated with fire ant insecticide, while the other six serve as a control group (no insecticide treatment). Pitfall trap surveys were conducted to evaluate insecticide success and to identify ant species within the wetlands. We are collecting bees once monthly during project duration. This study will be informative on how disturbances to water and vegetation in seasonal wetlands influences native bees and RIFA with respect to common waterfowl management practices. Preliminary data were not yet available at the time of this submission.

Presenter: Basant Pant

Presentation Session: MO10

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Kevin M. Hunt

Title: Determinants of landowner acceptance of increasing black bear populations in Mississippi

Abstract: The success of wildlife conservation efforts can increase human-wildlife conflict, particularly when stakeholder concerns are not adequately addressed. Growing wildlife populations often lead to declining stakeholder acceptance. Landowners play a key role in wildlife management; therefore, it is crucial to understand their intentions before implementing any conservation initiatives. However, there is limited understanding of what factors affect landowners' intentions about black bears in Mississippi. This study examines Mississippi landowners' willingness to accept the increasing black bear (Ursus americanus) population in the state. A mail survey (n = 4,032) was distributed to landowners to assess their acceptance of black bears on their properties. The study evaluated key psychological constructs, including attitude, social trust, perceived behavioral control (PBC), perceived benefits, and perceived risks, to determine their influence on landowners' intentions. The findings indicate that social trust, perceived risks and benefits, and PBC significantly affect landowners' willingness to accept black bears. These results emphasize the importance of risk communication, trust-building, and perceived behavioral control in shaping landowner perceptions and decision-making regarding black bear management. The study suggests that wildlife agencies should proactively address stakeholder concerns while leveraging the ecological and cultural value of black bears to foster coexistence.

Presenter: Krista Ruppert

Presentation Session: MO10

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Scott Rush, Wildlife, Fisheries, and Aquaculture

Title: Movement, microhabitat, and metapopulations: An overview of Gopher Frog (Rana [Lithobates] capito) ecology in Alabama

Abstract: Gopher frogs (Rana [Lithobates] capito) are pond-breeding amphibians native to longleaf pine forests of the southeastern United States. In Alabama, gopher frogs are a protected species known to consistently breed in two ponds, both located on the Conecuh National Forest. Gopher frog breeding wetlands are typically isolated, ephemeral ponds with minimal canopy and a lack of large predatory fish. Outside of the breeding season, gopher frogs can be found in and around burrows in sandy uplands, such as stump holes, small mammal burrows, and gopher tortoise burrows. Gopher frogs make yearly long-distance migrations from their upland burrows to breeding wetlands to reproduce, often returning to the same burrows following breeding. Here we give an overview of a multi-year project assessing post-breeding movement patterns, upland microhabitat use, and breeding community ecology of gopher frogs in Alabama in the context of management for this imperiled species.

Presenter: Zoe Scott

Presentation Session: MO10

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Kristine O. Evans, Associate Professor, Wildlife, Fisheries and Aquaculture

Title: Red-headed woodpecker nest site selection and nest survival in managed loblolly pine forests

Abstract: In forests managed for timber production, an important sustainability goal is promoting biodiversity, which can be achieved by managing for ecosystem engineers. The red-headed woodpecker (Melanerpes erythrocephalus; RHWO) is a primary cavity excavator and important to species diversity in managed loblolly pine (Pinus taeda) forests of the southeastern United States. However, RHWO nest site selection and its effect on nest survival is not well explored in working forest systems, particularly as they relate to snag retention practices. This research aimed to evaluate local and landscape factors governing RHWO nest site selection and survival in working loblolly pine forests within the coastal plains of the southeastern United States and develop recommendation for management. During the 2024 breeding season, we located and monitored 49 RHWO nests in four privately-owned and commercially managed forests in east Mississippi and west Alabama, with a second season planned for 2025. We followed nests from discovery to failure or fledging through visual observations of behavior and cataloging of nest contents. Measurements relating to surrounding vegetative cover and snag/cavity resources were taken at nests and up to 8 surrounding snags after nesting concluded. In the first year of our study we found that 30 nests were successful and 19 nests failed, with known failures attributable to windthrow and predation. We used conditional logistic regression to model nest site selection, and logistic exposure models to investigate potential influences of site on nest survival. Preliminary findings indicated similar nest site selection to RHWO in other systems, particularly open forest characteristics.

Presenter: Lily Thigpen

Presentation Session: MO10

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Melanie Boudreau, Professor, Wildlife, Fisheries, and Aquaculture

Title: Seeing Through the Murky Waters: Mapping Environment Characteristics in a Typical Catfish Aquaculture Pond

Abstract: Catfish aquaculture in the southeastern U.S. is primarily conducted in earthen pond systems, where environmental conditions influence production outcomes. Dissolved oxygen (DO) is a critical factor in ictalurid catfish production, as low DO levels limit feeding and growth. Temperature, another essential factor, influences catfish health, growth rates, and metabolic activity, and water flow dynamics introduced by aerators may play a role in catfish behavior and pond stratification. Additionally, the microbial community in aquaculture ponds plays an essential role in nutrient cycling, water quality, and, by extension, fish health. By advancing our understanding of the spatiotemporal dynamics of DO, temperature, water flow, and microbial communities in aquaculture ponds, this study aims to create a more comprehensive picture of environmental factors affecting catfish production. Mapping these characteristics both spatially and temporally will provide insights into optimizing pond management practices.

Presenter: Ruchita Bhattarai

Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Prakash Kumar Jha, Assistant Professor, Plant and Soil Sciences

Title: AI in Agriculture: Optimizing corn hybrid genetics for future climates

Abstract: The improvements of varieties and increment in productivity of crops are highly dependent on field-based experiments, that are time, resource and labor intensive. Due to resource and time constraints, computer simulations models play significant role in estimating genetic characteristics of hybrid using basic field phenological and yield data. Therefore, we need optimization tool to estimate genetic characteristics of hybrid varieties. Similarly, we can do reverse engineering to see what kind of cultivars are needed to be developed to achieve better or as similar production as we are having at present. Genotype Coefficient Calculator (GenCalc) and Generalized Likelihood Estimator (GLUE) facilitate in estimating the genetic coefficients of cultivars based on the phenological and growth parameters such as anthesis date, maturity date, and yield. In this study, we calibrated virtual cultivars for future climate scenarios using current field experimental data for responses of varietal growth and development. The genetic coefficients of virtual hybrid were optimized for future climate variables to inform breeders for varietal improvements with a range of genetic potentials. These AI based optimization tools will inform breeders, physiologists, and agronomists to realize potential of genotype, environmental, and management interactions.

Presenter: Kerington Bass

Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Lorin Harvey Plant and Soil Science

Title: Evaluation of Plant Growth Regulators on Sweetpotato Slip Propagation

Abstract: Producing sweetpotatoes involve several phases presenting unique challenges, most notably during transplanting. Sweetpotato slips, used for asexual reproduction, have non-uniform characteristics, making transplanting difficult. Additionally, the transition from a greenhouse to a field condition poses environmental risks and challenges, resulting in low transplant survival rates. A high slip mortality rate creates economic and logistical problems for producers. Plant growth regulators (PGRs) have been found to induce lignification or thickening of cell walls, which can alleviate environmental stresses in other crops; however, their impact remains unexplored in sweetpotato slips. Therefore, a study at Mississippi State University was conducted with the primary goal to enhance sweetpotato slip quality and improve transplant establishment rates. The study involves two greenhouse trials to identify the most effective PGR types and concentrations, and two histology trials to illustrate the effects of PGRs on sweet potato slip lignin and cell wall. The greenhouse trials utilize a randomized complete block design to assess four different PGR types and thirteen concentrations on three replications of sweetpotato slips with 38 subsamples per treatment per replication. Data on plant height, stem diameter, number of nodes, SPAD, leaf area, and dry weight and fresh weight of the slips and roots were collected to determine the effects of PGRs on the plants. The histology trials included the same PGR treatments and concentrations to the slips. The slips were then collected, cross-sectioned, stained, and evaluated and measured under a microscope. The study proved that PGRs do have an effect on sweet potato slips, by altering plant height, dry weight, and fresh weight, while not impacting the number of nodes. Thickening of the cell wall was also observed in slips treated with certain PGRs and it is hypothesized that this thickening of cell walls can contribute to reduced slip mortality when transplanting greenhouse produced slips to the field.

Presenter: Nestor Cordero

Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Luis De Avila, Professor, Plant and Soil Sciences

Title: Status of Amaranthus spp. Susceptibility to S-Metolachlor in Mississippi

Abstract: Palmer amaranth is one of the most troublesome and competitive weed species in Mississippi. It is a dioecious summer annual weed that causes significant losses to row crops in the state. Palmer amaranth is one of the few weeds in the United States that have evolved resistance to multiple modes of action herbicides (e.g. microtubule, photosystem (PS) II, acetolactate synthase (ALS), 5-enol-pyruvylshikimate-3-phosphate synthase (EPSPS), and hydroxyphenylpyruvate dioxygenase (HPPD) inhibitors). In 2019, resistance to Group 15 Herbicides (S-metolachlor) was reported in Arkansas. S-metolachlor is a foundation herbicide for many crops and is a vital tool for weed management. Therefore, there is a critical need to monitor S-metolachlor resistance evolution in Mississippi. This study aimed to monitor pigweed's resistance to S-metolachlor in Mississippi by collecting over 440 samples throughout Mississippi, primarily focusing on the highest cotton producing counties, mainly in the Mississippi Delta. A collection of 440 accessions of pigweed were sampled in the 2023 growing season. The samples were taken at row crop harvest in 40 counties around the state. After collecting the samples, the seedheads were dried, manually threshed, and then stored for four months under cold temperature to overcome dormancy for further testing. The test was performed in a randomized block design with three replications. A silty clay loam soil was collected, sieved and placed in a 72-cell gridded tray, where 50 seeds per cell were planted, each cell corresponded to one accession. S-metolachlor was applied at 1.9 kg ai/ha, the maximum field rate to confirm resistance. Weed control and weed emergence were recorded at 14 DAE. The average germination rates on the untreated checks accessions varied from 42 to 80%, and on the treated weed control varied from 95 to 100%, showing that all populations were controlled by the herbicide. All the 440 pigweed accessions sampled in 2023 growing season were susceptible to S-metolachlor.

Presenter: Bruna Dal'Pizol Novello

Presentation Session: MO2

Level of Study: PhD

Department: Plant and Soil Sciences

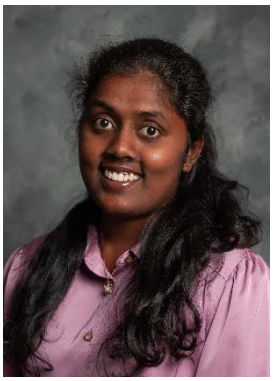
Category: Agriculture and Life Sciences

Advisor: Te Ming ‘Paul’ Tseng

Title: Dose-response curve of an allelochemical with potential for a new herbicide mechanism of action

Abstract: The scarcity of new herbicide mechanisms is surprising given the vast number of molecular targets in plants. Allelochemicals are promising due to their broader chemical space and structural diversity compared to synthetic compounds. As a preliminary step in investigating new herbicide mechanisms, dose-response and IC50 experiments are essential to determine the optimal dose. The aimed to evaluate the dose-response curve and IC50 of an allelochemical. The pure compound was diluted in agar at doses of 0, 50, 100, 200, and 300µM. Germination, length shoot and roots, fresh and dry mass of test plants were evaluated. Data was analyzed using R and AgroEstat software. In general, there was a greater reduction in all variables as the dose increased. Germination inhibition occurred above 200 µM, with 50 and 100µM reducing germination by 49.89% (IC50 = 104.08µM). Doses above 200 µM inhibited the shoot and root growth. Shoot length decreased by 49.8% at 50 and 100µM (IC50 = 104.08µM) and root growth by 43.4% and 51.21% at 50 and 100µM (IC50 = 112.07µM). Fresh mass reductions were 51.5%, 42.4%, 99.9%, and 100% at 50, 100, 200, and 300 µM, respectively (IC50 = 3.12µM). Dry mass decreased by 90.9% and 93.75% at 50 and 100 µM, with complete inhibition at higher doses (IC50 = 1.67µM). The allelochemical exhibited strong inhibitory effects in a dose-dependent manner, particularly affecting fresh mass. These results highlight its potential as a herbicidal compound, warranting further investigation into its mechanism of action.

Presenter: Apphia Santy



Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Guihong Bi, Professor, Plant and Soil Science

Title: Growing Raspberries in the South: Uncovering Heat-Tolerant Varieties for Mississippi

Abstract: Growing Raspberries in the South: Uncovering Heat-Tolerant Varieties for Mississippi

Apphia Santy*, Guihong Bi, Tongyin Li, Department of plant and soil science, Mississippi state University, Mississippi State, MS 39762(as5152@msstate.edu)

Traditionally, raspberry cultivation has been concentrated in cooler regions such as California, Oregon, and Washington, where mild climates favor production. But can raspberries grow in Mississippi's challenging subtropical climate? This research explores the potential of heat-tolerant raspberry cultivars to adapt to Mississippi's intense summer heat and fluctuating winter temperatures. Locally produced raspberries could meet growing consumer demand, driven by the fruit's well-known health benefits. This study evaluates the performance of various raspberry cultivars to identify those most suited to Mississippi's challenging climate while maintaining high fruit quality. The experiment utilized a randomized complete block design with cultivars grown under conventional and organic fertilizer treatments. Data collection focused on plant growth, fruit yield, key quality parameters such as berry size, sweetness, and acidity, as well as phytochemical attributes including total phenolics, flavonoids, anthocyanins, and antioxidants. Preliminary results revealed significant variation among cultivars. 'Prelude' and 'Himbo-Top' demonstrated the highest yields under both fertilizer treatments, while 'Tayberry' and 'Loganberry' produced the lowest. Cultivars such as 'Caroline,' 'Bristol,' and 'Loganberry' exhibited higher single berry weights, whereas 'Heritage' and 'Fall Gold' had lower weights. 'Bristol,' 'Anne,' and 'Latham' produced fruits with high soluble solid content, while 'Dormanred' and 'BP1' were less sweet. Acidity levels varied, with 'Polka' and 'Crimson Giant' being more tart, and 'Glencoe' and 'Niwot' being less acidic. This ongoing research aims to provide valuable insights into which cultivars are best suited for Mississippi's climate, to empower local growers with sustainable production options.

Presenter: Bala Subramanyam Sivarathri

Presentation Session: MO2

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa

Title: Genetic Diversity in Roots and Nodules of Soybean under Water-Deficit conditions

Abstract: Soybean (Glycine max L.) is a legume crop rich in oil and protein. Low rainfall patterns during key crop growth stages lead to suboptimal soil moisture conditions, often linked to lower yields in rainfed conditions. Roots are the primary sensory organs that detect stress signals and relay these signals above ground, facilitating necessary physiological adjustments. Previous research on field crops has shown that efficient root genotypes outperform shallow root genotypes under rainfed conditions by maintaining better tissue-water relations. Therefore, selecting genotypes with desirable root traits would help maintain higher biomass or yield under suboptimal conditions. This study evaluated the variability in root traits and nodulation of diverse soybean genotypes under water deficit conditions. Root morphology, nodulation, and biomass traits were quantified at the V4 stage and results indicated significant variability ($p<0.001$) under water-deficit conditions. Root diameter and root-to-shoot ratio were increased by 14% and 41% compared to control. Nodulation was significantly decreased by 75% under water-deficit conditions. R01-416F showed the highest tolerance among tested genotypes by adjusting root morphological and nodulation traits. Our research indicates that genotypes with higher rooting ability and moderate nodulation traits may help breeding programs to create superior resource -use-efficient soybeans for rainfed environments.

Presenter: Gifty Lad Ayela

Presentation Session: MO3

Level of Study: Master's

Department: Agricultural Economics

Category: Agriculture and Life Sciences

Advisor: Dr. Xiaofei Li, Professor, Agricultural Economics

Title: Developing Site-Specific Water Response Functions using Historical Soil Moisture Data

Abstract: Efficient use of water in agriculture is increasingly critical due to pressures from climate variability, population growth, and urbanization. Variable rate irrigation (VRI) systems offer a promising solution by optimizing water application based on site-specific needs in different areas within a field. While accurate crop water production functions (CWPFs) are essential for VRI, However, developing CWPFs has been hindered by challenges in data collection and the complexities of modeling water's impact on yields. This study attempts to develop site-specific CWPFs using farmers' historical soil moisture data and yield maps. Hourly soil moisture data was collected from 44 grid points at various soil depths in a 44-acre production field in Brooksville, Mississippi, covering three growing seasons (2018–2020). The spatial variability of the crop-water response functions was modeled using Geographically Weighted Regression (GWR) and machine learning algorithms. Both models revealed significant spatial variability in crop water responses, with the spatial variability patterns also differing annually due to the interactions with weather conditions. The findings highlight the potential of using producers' soil moisture sensor data to improve CWPFs estimation, offering a new framework for enhancing water management and increasing the efficiency of VRI technologies.

Presenter: Afra Anan Bhuiyan

Presentation Session: MO3

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Daniel Peterson, Professor, IGBB and BCH-NHP

Title: Validating Rps6ka6 and Pou3f4 as Possible Candidate Genes Linked to Variability in Muscle Mass

Abstract: Gene regulation plays a crucial role in shaping essential traits across biological systems, from skeletal muscle development in animals to immune signaling in plants. This study integrates functional genomics approaches to investigate key genes in these processes, utilizing CRISPR-Cas9 as a versatile tool for gene characterization. In mice, we examined the role of Rps6ka6 and Pou3f4 in muscle mass variability, identifying Rps6ka6 as a regulator of fast-twitch muscle fiber number and Pou3f4 as a determinant of slow-twitch muscle fiber composition. Using CRISPR-Cas9, we disrupted Rps6ka6, revealing its impact on muscle cell differentiation.

Building on this approach, we aim to apply CRISPR-Cas9 functional genomics to study genes involved in immunity and signaling in tomato and Arabidopsis. Similar to muscle regulation in animals, plant immune responses rely on precise gene-controlled pathways that govern cellular signaling and adaptation to environmental stressors. By identifying and manipulating key immune genes, we can enhance disease resistance in crops, paralleling the goal of understanding genetic determinants of muscle function in animals. This work highlights the power of CRISPR-Cas9 in elucidating gene function across diverse organisms, emphasizing its role in biomedical and agricultural advancements.

Presenter: Maryam Javanpour

Presentation Session: MO3

Level of Study: Master's

Department: Biochemistry, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Galen Collins (Assistant Professor , Department of Biochemistry, Nutrition and Health Promotion)

Title: Activation of 26S Proteasome by the Secondary Messenger cGAMP

Abstract: Proteasomes are multi-subunit protein complexes that maintain cellular homeostasis by degrading misfolded, inactive, or unnecessary proteins. This process regulates many critical biological activities, such as cell cycle progression, signal transduction, and immune responses, ensuring proper cellular function. Inadequate proteasome activity is associated with various diseases, including cancer, neurodegenerative disorders, and viral infections, highlighting the importance of understanding proteasome regulation. Recently, 26S proteasomes have been found to be activated by secondary messenger pathways to respond to stress. The cGAS-cGAMP-STING path, a central component of cellular innate immunity, detects cytosolic DNA and initiates immune responses. The cGAS-cGAMP-STING pathway has recently been shown to increase autophagy and the level of immunoproteasomes, improving MHC class I antigen presentation and stimulating adaptive immunity. However, its ability to directly activate conventional 26S proteasomes has not been studied.

We investigated the effects of cGAMP on proteasome activity and kinetics. Using the LLVY peptidase assay, we treated cells with 50 nM cGAMP at various time points and quantified chymotrypsin-like activity by measuring fluorescence upon substrate cleavage. Results showed that cGAMP rapidly increased proteasome activity in treated samples compared to controls. Furthermore, labeling 26S proteasomes with the fluorescent covalent inhibitor MVB127 demonstrated that cGAMP increases proteasome activity without increasing proteasome abundance, unlike the later induction of immunoproteasomes observed previously.

Ongoing efforts aim to elucidate cGAMP-induced proteasome activation's molecular mechanisms, including interactions with proteasome subunits . Our findings offer valuable insights into cellular defense mechanisms and may inform therapeutic strategies for diseases characterized by proteostasis imbalance or immune dysfunction.

Presenter: Sujin Lee

Presentation Session: MO3

Level of Study: PhD

Department: Biochemistry, Nutrition, and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Seung-Joon Ahn, Assistant professor, Department of Biochemistry, Nutrition, and Health Promotion

Title: Detoxification of gossypol from cotton by UDP-glycosyltransferase in the cotton pest Helicoverpa zea

Abstract: Gossypol, a yellow-colored sesquiterpene dimer, is a major secondary metabolite produced by cotton plants to defend against insect herbivores and pathogens. Insect UDP-glycosyltransferases (UGTs) act upon diverse phytotoxins and insecticides as phase II detoxification enzymes. Identifying the detoxification roles of UGT genes is essential for discovering the molecular mechanisms underlying insect adaptation to plant secondary metabolites. However, the genetic basis of gossypol tolerance in cotton-feeding insects remains unclear. In this study, we examined the effects of gossypol on two major cotton pests in the southern U.S., the corn earworm (Helicoverpa zea) and the soybean looper (Chrysodeixis includens). Larval feeding studies revealed that 1,000 ppm gossypol diet significantly inhibited larval growth in C. includens, whereas H. zea showed no detectable effects, suggesting greater tolerance in H. zea. qRT-PCR analyses in H. zea larvae identified four UGT genes, HzUGT33B9, HzUGT40D1, HzUGT41B1, and HzUGT41D1, that were significantly upregulated in response to gossypol exposure. Functional characterization of these candidate UGTs was conducted using RNA interference (in vivo) and heterologous expression in Sf9 cells (in vitro). Knockdown of HzUGT41B1 resulted in significant weight loss in larvae fed a gossypol diet, suggesting its role in detoxification. Sf9 cell assays demonstrated that HzUGT41B1 exhibited high glycosylation activity against gossypol and other plant secondary metabolite. Additionally, phylogenetic analysis provided insights into the role of the UGT41 gene family in detoxification. This study deepens our understanding of the evolutionary mechanisms driving host adaptation and provides practical insights into the potential use of cottonseed meal in animal feed.

Presenter: Faria Noshin

Presentation Session: MO3

Level of Study: PhD

Department: Agricultural Science and Plant Protection

Category: Agriculture and Life Sciences

Advisor: Dr. Chang Liu, Assistant Professor, Agricultural Science and Plant Protection

Title: Evaluation of electronic noses(e-noses) for insect pest monitoring under greenhouse condition

Abstract: Plant diseases and pest infestations pose significant challenges to agricultural production and leading to substantial economic losses. Early detection of infestations, particularly before visible symptoms appear, is crucial for effective management and control measures. However, traditional diagnostic methods, which rely on symptom analysis and molecular techniques, are limited by their destructive nature, specificity, and cost. As an alternative, the detection of herbivore-induced plant volatile organic compounds (VOCs) by electronic nose (e-nose) offers a non-invasive, rapid, and real-time approach to monitor plant health. This study investigates the application of e-noses for detecting VOCs emitted by plants such as cotton, sweet pepper, corn, and cabbage in response to herbivore attacks, particularly from Helicoverpa armigera and Spodoptera exigua (Lepidoptera, Noctuidae). The experiments involved various setups, including open environments, clip cages, bagged leaves, and plastic cylinders. The results demonstrate that while e-noses effectively detect certain VOCs like α-Pinene and DMNT, their sensitivity varies depending on the compound and concentration. Confined setups, such as plastic cylinders, allowed for more consistent VOC detection, revealing significant differences between infested and non-infested plants. Gas chromatography-mass spectrometry (GC-MS) analysis further validated the differential emission of VOCs in response to herbivory, highlighting the potential of e-noses for early and non- destructive detection of plant stress. This study underscores the promise of integrating VOC-based detection with e-nose technology to enhance pest management strategies and support sustainable agriculture.

Presenter: Edirisa Juniour Nsubuga

Presentation Session: MO3

Level of Study: PhD

Department: Biochemistry, Nutrition, and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Joel J. Komakech; Assistant Professor; Department of Biochemistry, Nutrition, and Health Promotion

Title: Prevalence and Determinants of Growth and Anemia Among Children Aged 6–59 Months in Busoga Region, Uganda, May–June 2024

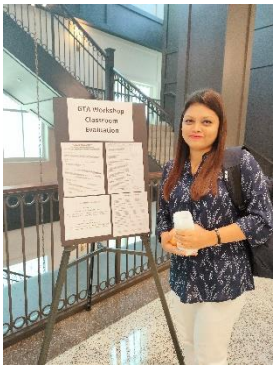
Abstract: Objectives: This study examined the prevalence and determinants of growth and anemia among children aged 6-59 months in the Busoga Region, Uganda.

Methods: This cross-sectional study included 439 caretaker-child dyads with children aged 6-59 months. Random sampling determined households and eligible children. The WHO growth standards defined child stunting, underweight, and wasting. Adjusted for altitude, UNICEF cut-offs determined child anemia status. Logistic regression generated crude and adjusted odds ratios (AORs) for child wasting and stunting predictors. Modified Poisson regression determined stunting and anemia predictors through unadjusted and adjusted prevalence ratios (APRs). Significance was set at $p<0.05$.

Results: Mean child age was 27±14 months, with 52.4% males. Wasting, underweight, stunting, and anemia prevalence was 8.2%, 8.8%, 29.6%, and 67.4% respectively. Child wasting was associated with a higher diarrhea likelihood (AOR=2.8[1.3-5.9], p=0.007), measles (AOR=2.2[1.1-4.6], p=0.045), and no breastfeeding history (AOR=5.7[1.3-26], p=0.024). Underweight was lower among children of caretakers aged 26-44 years (AOR=0.3[0.1-0.8], p=0.023), but higher with increased maternal parity (AOR=5.2[1.3-21], p=0.020), no breastfeeding history (AOR=9.0[1.7-48], p=0.01), incomplete immunization (AOR=7.0[2.2-22], p=0.001), and diarrhea (AOR=2.4 [1.0-5.4], p=0.042). Child stunting increased with incomplete immunization (APR=1.9[1.2-3.0], p=0.009), and household size of 4-5 (APR=1.8[1.1-3.2], p=0.029) or ≥6 members (APR=2.0[1.2-3.6], p=0.014). Child anemia risk was higher with malaria history (APR=1.2[1.1-1.4], p=0.023), and caretakers aged 45-59 years (APR=1.5[1.1-2.1], p=0.025) but lower in children aged 36-47 months (APR=0.6[0.5-0.8], p=<0.001) and 48-59 months (APR=0.6[0.5-0.8], p=0.006).

Conclusions: Integrated nutrition-sensitive interventions including vaccination coverage, family planning, long-lasting insecticide-treated mosquito net use, and optimal child feeding sensitization, could improve child growth and anemia reduction.

Presenter: Sharnali Das



Presentation Session: MO4

Level of Study: PhD

Department: Biological Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Ling Li, Associate Professor, Department of Biological Sciences

Title: Investigating the Functional Roles of Genes with Identical Sequences in Both Mitochondria and Nucleus

Abstract: Eukaryotic cells possess separate genomes within the nucleus and mitochondria, yet some genes share identical sequences between these two organelles. This intriguing occurrence, observed in Arabidopsis thaliana, a model organism in plant biology, raising significant questions about the functions and regulation of these dual-localized genes. In this study, we conducted a comprehensive bioinformatics analysis to examine the functional roles of two mitochondrial genes, AtMG1 and AtMG2, and their nuclear counterparts, At2GMG1 and At2GMG2, respectively. Our findings indicate that AtMG1 is associated with embryo development and tissue regeneration, while its nuclear counterpart, At2GMG1 is linked to stress response, pathogen defense, and tissue regeneration. Similarly, At2GMG2 plays a role in plant development, stress response, pathogen defense, and tissue regeneration, while AtMG2 is implicated in tissue regeneration and embryo development. We are developing overexpression mutants and protein-protein studies for these genes to further investigate the functional similarities and differences between their nuclear and mitochondrial versions. This research aims to provide valuable insights into the coordination and interaction between mitochondrial and nuclear genomes, enhancing our understanding of their roles in plant development and stress response.

Presenter: Prattay Dey

Presentation Session: MO4

Level of Study: PhD

Department: Biological Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Justin A. Thornton, Professor, Biological Sciences

Title: Dual Pneumococcal Protein-Based Vaccine Strategy: Targeting ANXA2-Adhesins and Decoding Host Receptors in Human Epithelium

Abstract: Streptococcus pneumoniae (pneumococcus), is a gram-positive colonizer of the human nasopharynx, capable of causing minor infections and life-threatening diseases. Polysaccharide-based vaccines are effective against certain invasive serotypes, but they fall short in limiting overall colonization rates, which facilitates the spread of the bacteria and contributes to serotype replacement. Our research focuses on the interaction between Pneumococcal Surface Adhesin A (PsaA) and the human receptor Annexin A2 (ANXA2). This understudied interaction contributes to the colonization process, suggesting that targeting it could lead to a novel type of protein-based vaccine effective against a broader range of serotypes and capable of reducing colonization. We hypothesize that epitope mapping of PsaA and using far western blot to identify other pneumococcal adhesins interacting with host receptors could revolutionize protein-based pneumococcal vaccine development.

We previously used far-western blot technique to identify ANXA2 as a host cell receptor for PsaA. We performed confocal microscopy to demonstrate ANXA2 as a surface-expressed protein on Detroit562 nasopharyngeal cells. We utilized the crystal structures of PsaA and ANXA2 to construct a protein-protein interaction model with ClusPro® and analyzed this model using Pymol®. Based on these findings, we designed primers for five distinct PsaA-derived peptides, cloned, expressed, and affinity purified each peptide for epitope mapping studies. Furthermore, we conducted far western blot experiments using whole-cell lysates of S. pneumoniae to identify additional candidates interacting with ANXA2.

The binding affinity of PsaA with human ANXA2 was confirmed by far western and mass spectrometry. PsaA peptides were successfully expressed and purified to perform binding assays with recombinant ANXA2. Interestingly, far western blot analysis of pneumococcal whole cell lysates probed with recombinant ANXA2 revealed multiple bands, indicating additional pneumococcal proteins interact with ANXA2.

This study demonstrates that ANXA2 acts as a host cellular receptor for pneumococcus. We believe epitope mapping of PsaA and identifying new bacterial ligands for ANXA2 will play a significant role in the development of the protein-based vaccine against S. pneumoniae.

Presenter: Achini Mala Sri Ovitigala

Presentation Session: MO4

Level of Study: PhD

Department: Physics and Astronomy

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Chuji Wang, Professor, Physics and Astronomy, Mississippi State University

Title: Temperature and pressure dependence of the reaction between BrHg and O3

Abstract: Mercury is a common globally pollutant and neurotoxic that has been linked to adverse effects on human health and ecological health. Although gaseous elemental mercury (Hg(0)) dominates mercury emissions to the atmosphere, the rate of oxidation to mercury complex (Hg(II)) plays an important role in determining where and when mercury accumulates in ecosystems. Atomic bromine is known to induce oxidation in the atmosphere via a two-step mechanism.

$Hg + Br + M \rightarrow BrHg + M$ (R1)

$BrHg + Y + M \rightarrow BrHgY + M$ (R2)

We used a laser photolysis-laser induced fluorescence (LP-LIF) spectroscopy setup to assess rate constants vs temperature and pressure in our study. BrHg was produced by 266 nm laser photolysis of HgBr2 vapor. Laser excitation at around 256 nm resulted in laser generated fluorescence of BrHg near 502 nm.

For the reaction of BrHg + O3;

$BrHg + O3 \rightarrow BrHgO + O2$ (R3) alone with two side reactions,

$BrHg + O \rightarrow Hg + BrO$ (R4)

$BrHgO + O \rightarrow HgBr + O2$ (R5)

We present LIF decay measurements obtained by conducting experiments at different ozone concentrations and varying photolysis laser energies to distinguish the individual effects of R1, R2, R3, R4, and R5 on the LIF decays of HgBr at different temperatures and pressures.

The work is supported by the NSF National Science Foundation via the grant 2108712.

Presenter: Ramtin Vamenani

Presentation Session: MO4

Level of Study: PhD

Department: Biological Sciences

Category: Agriculture and Life Sciences

Advisor: Ling Li, Associate Professor, Department of Biological Sciences, Mississippi State University, Mississippi State, MS, USA

Title: Enhancing Nutritional Content in Sweet Potato through the Orphan Gene QQS: A Metabolic Engineering Approach

Abstract: The allocation of carbon and nitrogen resources in plants, directing synthesis toward proteins and carbohydrates, is a complex, gene-regulated process that remains only partially understood. Qua-Quine Starch (QQS), an orphan gene unique to Arabidopsis thaliana, exhibits a novel and unexpected functionality without homologs in other species.

QQS has been shown to regulate carbon and nitrogen partitioning, influencing leaf and seed composition in Arabidopsis and crops such as soybean, corn, rice, and potato. In this study, we expanded the application of QQS by introducing it into sweet potato (Ipomoea batatas, cv. Red Jewel), a crop known for its low protein content. Using Agrobacterium-mediated gene transformation, QQS was expressed in sweet potato plants, and the most promising lines were identified through RT-qPCR analysis. Protein and starch levels in leaves were quantified using the Modified Lowry Protein Assay and the Glucose Oxidase/Peroxidase (GOPOD) assay, respectively.

Our results show that transgenic sweet potato plants expressing QQS demonstrated a 51.4% increase in protein content, significantly enhancing the nutritional profile of this protein-poor crop. Additionally, starch accumulation in transgenic leaves was reduced by 18.6% compared to wild-type controls. This shift in carbon and nitrogen allocation indicates that QQS effectively redirects metabolic resources from carbohydrate storage toward protein synthesis, offering a powerful tool for metabolic engineering.

To our knowledge, this is the first successful transgenic approach in sweet potato that simultaneously elevates protein levels while reducing starch content. These findings highlight QQS' potential as a key target for metabolic engineering aimed at optimizing carbon and nitrogen utilization in various crops.

Presenter: Roberto Venta

Presentation Session: MO4

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr Colleen Scott, Associate Professor, Department of Chemistry

Title: Alternative poly (ester acetal)s as degradable replacement for commodity plastics

Abstract: Plastic waste has become a significant problem in recent years due to its adverse environmental impact. The main challenge is the high production volume of commodity plastics and the lack of degradation or proper disposal, which leads to massive accumulation in landfills, oceans, and forests. To address this issue, there is a great demand for developing polymers that possess similar thermal and mechanical properties to commodity plastics but degrade appreciably to protect our environment. Here, we designed and synthesized a series of bio-based degradable copoly (ester acetal)s derived from vanillin. The biobased vanillin core offers the potential for similar mechanical and thermal properties to some commodity polymers, while the labile acetal group incorporated into the backbone provides degradability to the polymers. We described the synthesis of some homopolymers and copolymers, which were characterized using 1H NMR, DSC, and GPC. The results show current Tg values between 10-38 oC at a molecular weight (Mw) of 15 kDa and a 1.2 degree polymerization index (PDI). Additionally, the 1,5,7-triazabicyclo[4.4.0]dec-5-ene (TBD) catalyst gave higher performing polymers compared to commercial Lewis-Acid metal catalysts.

Presenter: Sujita Balami

Presentation Session: MO5

Level of Study: PhD

Department: Pathobiology and Population Medicine

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Matt Griffin

Title: Identification of Potential Live-Attenuated Vaccine Candidate Against Edwardsiella piscicida in Channel Catfish (Ictalurus punctatus) × Blue Catfish (I. furcatus) Hybrids

Abstract: In US catfish aquaculture, hybrid catfish have gained popularity as an alternative to channel catfish occupying >50% of the industry, owing to several favorable production traits, including improved growth and feed conversion, increased tolerance to low dissolved oxygen and reduced susceptibility to several channel catfish diseases. However, concurrent with the increased adoption of hybrid catfish has been the emergence of Edwardsiella piscicida in U.S. catfish aquaculture. Hybrid catfish account for >90% of E. piscicida diagnoses at the Aquatic Research and Diagnostic Laboratory in Stoneville, MS, and have caused significant losses in both hybrid and channel catfish production systems. A member of the Hafniaceae family, E. piscicida is recognized as a global fish pathogen, with reports from at least 30 different fish species worldwide. Despite its global impact, there are limited commercially viable vaccines for E. piscicida, particularly in catfish. In this study, representative isolates from five discrete phyletic E. piscicida lineages were passed on plates containing increasing concentrations of rifampicin (RIF), up to 360 µg/ml. A total of 17 RIF mutant strains were produced and tested for attenuation and protection in two different experimental trials. The first attenuation trial included 10 candidate isolates. Hybrid catfish were concurrently exposed to both the RIF mutant and the wild-type parent through IC injections (~1x104 CFU per g of fish). While low-level mortality (<20%) was observed in all wild-type treatments, mortality was negligible in fish inoculated with RIF-passed mutants. However, this reduced mortality was significant in only 3 of 10 tested RIF mutants. Subsequent rechallenge revealed significant protection against E. piscicida isolate S11-285 for 9 of 10 wild-type strains, but only four of 10 RIF mutants, possibly a result of low immunizing dose or excessive attenuation. The four successful mutants yielded relative percent survival (RPS) of ~ 74-76%. A second trial was conducted similarly, with a higher inoculating dose (~3-6×105 CFU per g of fish) using seven discrete RIF mutants and their wild-type parents. High mortality (>90%) was observed in all wild-type strains, however three RIF mutants showed significant attenuation compared to their wild-type counterparts, with nearly 2-3 fold reductions in mortality. Upon challenge with virulent S11-285 all three mutants showed RPS 75-82%. The low level of mortality and high level of protection conferred by RIF mutants suggests it is a suitable attenuated strain and should be investigated further as a vaccine.

Presenter: Jaydon Gibson

Presentation Session: MO5

Level of Study: Master's

Department: Biomedical Engineering

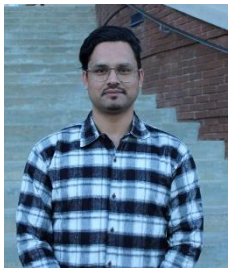
Category: Engineering

Advisor: Dr. Lauren B. Priddy, Professor, Biomedical Engineering

Title: Perfusion-Compression Bioreactor System for Osteogenesis in Polymer Scaffolds

Abstract: Biomaterial scaffolds play a crucial role in osteogenesis by providing mechanical stability and a surface for cell attachment and proliferation. Bioreactors offer benefits for the culture of cell-seeded scaffolds by providing mechanical forces and nutrient flow which mimic physiological loading conditions, promoting osteogenesis and improving tissue integration. The objective of this project is to customize and utilize a perfusion-compression bioreactor system for the culture of preosteoblast cells on 3D-printed polymer scaffolds, allowing for adaptable experiment conditions for bone tissue engineering approaches. This system consists of two loading frames, each with three culture chambers. Previously, mesenchymal stromal cells seeded statically onto femur explants had lower seeding efficiency than expected, and explant surfaces were not flat, which likely led to nonuniform compressive load distribution through the sample. As oscillation seeding reportedly increases seeding efficiency, a three-chamber oscillation seeding device was constructed to facilitate flow of cell-laden media back and forth through six scaffolds simultaneously. Further, 3D printing of polymer scaffolds will ensure flat surfaces for uniform compressive loading. In the seeding device, volume of water after perfusion for 10 minutes (n=3) at angular velocities corresponding to target flow rates of 0.2, 1, 2, and 5 mL/min was measured. In the bioreactor, the scaffolds underwent 1000 cycles of 15 N target compression (to achieve 1500-2500 microstrain, which reportedly promotes osteogenesis) 3 times a day for 7 days. Effective application of perfusion and compression stimuli during cell seeding and culture in bioreactor systems can improve the outcomes of these bone tissue engineering approaches.

Presenter: Hemraj Kathayat



Presentation Session: MO5

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Attila Karsi, Professor, Department of Comparative Biomedical Sciences, CVM

Title: Development of Efflux Pump Mutants in Edwardsiella ictaluri

Abstract: Abstract:

Bacterial diseases are a significant concern in channel catfish farming. Edwardsiella ictaluri is a Gram-negative pathogen that causes enteric septicemia in catfish. Although antibiotics are commonly used as therapeutic agents, bacteria can develop antibiotic resistance through various mechanisms. The efflux pump system limits the efficacy of antibiotics by actively expelling and reducing intracellular drug concentrations. The role of the efflux pump system in E. ictaluri virulence has not been explored yet. Thus, we aim to develop efflux pump mutants and characterize their contribution to bacterial virulence in catfish. To achieve this, we identified conserved efflux pump genes of E. ictaluri through pan-genome analysis and categorized them functionally. Selected genes are being deleted in-frame to construct efflux pump deficient E. ictaluri mutants. After mutant construction, they will be characterized using various experiments, including evaluating the virulence in catfish. These finding could aid in developing efflux pump inhibitors or vaccines to control E. ictaluri infections.

Presenter: Mercy Ogunruku

Presentation Session: MO5

Level of Study: PhD

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: DR. Elizabeth Stokes, Associate Professor, Sustainable Bioproducts Department

Title: Wood Science Education in the United States: A Comprehensive Review of Challenges, Strategies and Future Directions

Abstract: Wood science education in the United States has reached a critical stage, facing significant challenges that threaten academic programs' sustainability and relevance. This review examines the historical context, current state, and future of wood science education in the United States, focusing on identifying the factors contributing to declining undergraduate enrollment and evaluating the effectiveness of strategies used or discussed by universities to address these challenges. Despite the initial growth of wood science programs through the 1970s, enrollment has been steadily declining since the 1980s. This review identifies factors contributing to this decline, including poor perceptions of the discipline, assumptions about limited career opportunities, shifting industry needs, and competition from emerging interdisciplinary fields. Universities at different times have tried to deal with the enrollment challenges with strategies, such as curriculum changes, rebranding efforts, adding new majors, merging with other departments, offering online programs, and increasing recruitment efforts. However, these strategies have not yielded the expected results, suggesting a need for a more comprehensive and coordinated approach to revitalizing wood science education. The review argues that ensuring the long-term sustainability and relevance of wood science education requires a critical re-evaluation of program structures, curricula, and recruitment strategies. Recommendations include establishing consistent program nomenclature, updating and ensuring uniformity of curricula that meet industry needs and challenges, and developing targeted recruitment approaches in collaboration with forestry schools and industry partners. Collective efforts from the wood science education community are urgently needed given the growing demand for sustainable materials and wood-based solutions to global environmental challenges. Improving wood science education is crucial to train undergraduates with the right skills to advance the wood industry and ensure sustainability. This review aims to stimulate debate and action among wood science academics, educators, and industrial stakeholders for a thoughtful analysis, recommendations, and futuristic ideas.

Presenter: Divya Rose

Presentation Session: MO5

Level of Study: PhD

Department: Pathobiology and Population Medicine

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Matt Griffin, Research Professor, College of Veterinary Medicine, Department of Pathobiology and Population Medicine

Title: Antibiotic Resistance in Microbial Communities from Catfish Culture Systems: A Cross-Sectional Analysis

Abstract: Disease-related losses in catfish aquaculture are majorly attributed to bacterial infections. While an effective Edwardsiella ictaluri vaccine exists, disease management of other pathogens relies heavily on three FDA-approved antibiotics (oxytetracycline, florfenicol, and sulfamethoxine/ormetoprim). Limited antibiotic options have led to antimicrobial resistance (AMR), with multi-drug resistance (MDR) documented in pathogens like Edwardsiella ictaluri, E. piscicida, and Plesiomonas shigelloides. However, these studies rely solely on diagnostic case reports and do not examine the role of environmental reservoirs in the persistence and spread of AMR. Based on diagnostic submissions, AMR disappears over winter, is generally absent during spring and early summer outbreaks, and re-emerges with renewed treatment, suggesting environmental reservoirs harbor these resistance elements. Many resistance elements are carried on conjugative mobilizable plasmids, along with other resistance elements, implying they may be sustained by alternative selective pressures such as heavy metals and minerals. This study examined the pond water microbiome, focusing on culturable bacteria with reduced susceptibility to oxytetracycline and florfenicol from two commercial farms—one using antibiotics and one not. Differences were observed between overall pond water communities and culturable bacteria across systems. Similar microbial groups harbored AMR in both treated and untreated ponds. The presence of MDR plasmids in non-pathogenic bacteria suggests resistance genes persist without direct antibiotic pressure. Findings highlight that antibiotic use alone does not explain AMR persistence, emphasizing the role of environmental reservoirs. These results highlight the need for proactive bacterial disease management strategies to ensure sustainable aquaculture.

Presenter: Vijaykumar Hosahalli

Presentation Session: MO6

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli

Title: Harnessing the Potential of Biostimulants to Mitigate Drought in Soybean

Abstract: Soybean yields are challenged by drought stress causing more than 50% reduction in yield. Biostimulants, widely regarded as substances or organic compounds that enhance plant growth by improving physiological processes and nutrition efficiency, also play a crucial role in abiotic stress tolerance; however, their effectiveness in mitigating drought stress in soybeans has not yet been studied. The objective of the study is to assess the effectiveness of biostimulants, either individually or in combination in alleviating early stage and reproductive stage drought stress by enhancing physiological and yield traits in soybean. A total of 15 biostimulant treatments, either individually or in combination with polymers, were used in the study. The results demonstrated that insufficient soil moisture led to a decrease of stomatal conductance by 64.05% and 76.11% and transpiration by 38.44% and 48.46% respectively under early stage and reproductive stage drought stress respectively. Trevo increased stomatal conductance and transpiration by 62.29% and 43.07%, respectively under early-stage drought stress and Regalia increased stomatal conductance and transpiration by 79.31% and 8.67%, respectively under reproductive stage drought stress. On average, drought stress decreased shoot biomass by 30.76% during early growth stages and 21.60% during reproductive stages. Zypro and BioWake increased biomass by 6% and 5%, respectively during reproductive stages drought stress. Trevo increased the seed yield by 32.13% compared to untreated check under reproductive stage drought conditions. Biostimulants showed minimal effect in alleviating drought stress during early-stages and reproductive stages. Further research is needed to explore biostimulants' effectiveness in drought tolerance of soybeans.

Presenter: Jing Huang

Presentation Session: MO6

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Fernando Y. Yamamoto

Title: Assessing Animal By-products and Soybean Meal as Potential Fish Meal Replacements in Channel Catfish (Ictalurus punctatus) Feeds

Abstract: Catfish is the most important farmed fish in the US. Commercial animal- and crop-derived by-products are important protein feedstuffs and hold promise to increase sustainability in aquaculture. In this study, five experimental diets were formulated with soybean meal (SBM), fishmeal (FM), animal protein concentrates (APC-A/B), and poultry by-product meal (PBM) were assessed in a 70-day feeding trial. Channel catfish (Ictalurus punctatus) juveniles (initial weight=15.3 g) were randomly distributed into 25 tanks with (30 fish/tank; n=5) operating as a recirculating aquaculture system. During the feeding trial, fish received rations according to the biomass, twice daily, and growth performance was evaluated biweekly. At the end of the feeding trial fish fed the SBM diet had the lowest growth performance (GF), the highest intraperitoneal fat (IPF) accumulation, and the lowest survivability after a Edwardsiella ictaluri challenge. On the other hand, PBM showed potential to replace FM, as the ingredient provided a relatively well-balanced amino acid profile. Catfish fed with PBM had a comparable growth with the FM treatment, and the highest survivability after the bacterial challenge. The intestinal microbiota exhibited a higher relative abundance of Pediococcus and Oscillospirales in fish fed the PBM and APC-A diets, respectively. In conclusion, PBM proved to be a suitable alternative ingredient in the catfish feeds, which could be more cost-effective when compared to FM, without exhibiting adverse effects. In contrast, SBM is considered the least desirable replacement for FM in catfish feeds.

Presenter: Emily Magee

Presentation Session: MO6

Level of Study: Master's

Department: Poultry Science

Category: Agriculture and Life Sciences

Advisor: Dr. Timothy Boltz, Assistant Professor, Department of Poster Science

Title: Evaluating The Effect of Feed Sanitizer Products on Feed Mill Equipment and its Impact on Feed Microbial Reduction

Abstract: Feed sanitation is essential to the poultry industry as it contributes to decreasing microbial pathogen loads in feed, increasing bird performance and food safety. This study aims to evaluate the efficacy of a synergistic blend of phytochemicals and carboxylic acid (Product 1) and an organic acid blend (Product 2) in reducing microbial pathogens when applied to feed. A basal diet, was batch-mixed before treatment with sanitizers. The study was replicated 3 times, with each run consisting of 7 treatments. Treatments included Product 1 and/or Product 2 were used to treat SBM or feed contaminated with a Salmonella Infantis inoculum. After each treatment, feed and swab samples were taken from the mixer. Samples were assessed for Salmonella colony enumeration and prevalence. For enumeration, each sample was plated and diluted on Xylose-Lysine-Tergitol 4 (XLT-4) agar. For prevalence, samples were enriched in Tetrathionate broth (TTB) and plated. All data was analyzed using SAS with a one-way ANOVA utilized for enumeration and Chi-square for prevalence data. The results of feed sample enumeration indicate that inoculated feed allowed Salmonella to remain in the mixer and contaminate future batches of feed. Treatments including Product 1 and/or Product 2 significantly reduced Salmonella counts. From overall feed enumeration results, the product combination treatment demonstrated the greatest reduction in Salmonella. This study demonstrates that using sanitizers to control feed microbial pathogens can control Salmonella on equipment and in feed. Future work will test these products with different strains of Salmonella, and diet types.

Presenter: Alyssa Miller

Presentation Session: MO6

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Te-Ming Tseng, Associate Professor, Plant and Soil Sciences

Title: The Evaluation of Sweetpotato (Ipomea batatas) Variety Tolerance to Different Herbicide Treatments in a Field Atmosphere

Abstract: The limited number of herbicides approved for use in sweetpotato (Ipomoea batatas) production in the United States underscores the necessity of registering additional herbicides with different modes of action (MOA). Expanding herbicide options could improve weed control, enhance yields, and support a more sustainable sweetpotato (SP) production system. This study was conducted to evaluate the performance and crop tolerance of specific herbicides applied to the Beauregard SP variety under field conditions. The research was designed using a randomized complete block setup with three replications per treatment, including an untreated control. Herbicide treatments included both pre-emergence (PRE) and post-emergence (POST) applications, applied using a International 140 tractor sprayer calibrated to deliver 20 gallons per acre (GPA) through XR8002 flat fan nozzles. The herbicides tested included fluridone, glyphosate, glufosinate, carfentrazone, saflufenacil, and acifluorfen, among others, applied as PRE or POST treatments. Sweetpotato injury was evaluated visually, with injury ratings recorded at 7, 14, 21, and 28 days after treatment (DAT). At the end of the growing season, harvestable yields were measured and categorized into US No. 1, Canner, Cull, and Jumbo grades, with total marketable yield calculated as the combined weight of US No. 1, Canner, and Jumbo categories. Metribuzin applied POST transplant demonstrated minimal crop injury and resulted in high yields. The findings from this research will offer practical insights into herbicide use in field conditions, aiding the development of better weed management practices for sweetpotato production.

Presenter: Oluwaseyi E. Olomitutu

Presentation Session: MO6

Level of Study: PhD

Department: Plant and soil sciences

Category: Agriculture and Life Sciences

Advisor: Michael J. Mulvaney

Title: Impact of Planting Speed and Downforce on Corn Seeding

Abstract: The primary purpose of using a planter is to place seeds uniformly at the intended plant spacing and target planting depth. Increased ground speed and surface roughness linearly increase planter components vibration which compromise seed meters' ability to singulate effectively, resulting in nonuniform seed spacing distribution. Increasing downforce on row units could be used to minimize vibration. However, application of downforce can be challenging as it could compact soil, affect seeding depth, cause poor root development and uneven plant emergence. Current advances in hydraulic downforce systems make it possible to choose between dynamic and static downforce operational modes during planting. Therefore, the objective of this study is to determine the effect of planting speed and downforce settings on planter components vibration, corn seed placement uniformity and yield. The trial was conducted during the 2024 cropping season at two locations (Brooksville and Stoneville) in MS. A four-row precision planter (John Deere® MaxEmerge 2 row units retrofitted with Ag Leader® SureSpeed and SureForce) was used. The experimental design was a 2 × 2 × 3 factorial laid out in a randomized complete block design, with each treatment replicated four times. The treatments were two planting speed (8.1 and 16.1 km h-1), two downforce mode (dynamic and static), and three downforce operational settings (minimum, medium, and heavy). The planter was set up to plant at 3 – 4 cm depth. Corn hybrid DKC70-27 was planted at 85,000 seeds ha-1. Planter components vibration was measured using Extech VB300 3-Axis G-Force Datalogger. Data were recorded on actual plant population, plant spacing, and seed depth. Grain yield, mean plant spacing, spacing variability (standard deviation), quality of feed index, skips, multiples, and overall precision were estimated. Preliminary results will be presented.

Presenter: Sujan Poudel

Presentation Session: MO6

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli, Assistant Professor, Plant and Soil Sciences

Title: Quantifying Resilience of Cowpea to Soil Moisture Deficit

Abstract: Cowpea is an important legume crop cultivated worldwide for its nutritional benefits and adaptability. Nonetheless, drought challenges rainfed agriculture, impacting plant growth and crop yield. While cowpea's importance is widely acknowledged, research examining the influence of growth stage-specific physiological and morphological traits resilience to drought and their yield contribution remains sparse. To address the gap, we conducted three experiments: (i) quantifying the effects of water deficit (WD) at vegetative and reproductive stages on morpho-physiological traits and yield performance, (ii) assessing the variability in morpho-physiology traits' tolerance to WD during the early vegetative stage and (iii) quantifying the resilience of various cowpea genotypes to WD during the bloom stage. In Exp. 1, a reduction in photosynthetic assimilation correlated with reduced biomass accumulation, with notable decline of 68%, 49%, 58%, and 53% at the V2, V4, R1, and R4 stages, respectively. Of the four growth stages tested, the R1 was most sensitive to WD, causing a 46% reduction in yield, followed by a 35% reduction during the R4 and vegetative phase (33% reduction at V2 and 27% at V4). Significant variability in trait resilience to WD was noted in genotypes at V2 and R1. At the V2 stage (Exp. 2), there were significant reductions in leaf and node counts, with decreases of 28% and 38%, respectively. Notably, a substantial decline in shoot biomass (51%) and root biomass (32%) was recorded. In Exp. 3 (at R1), WD condition significantly decreased gas exchange traits and increased canopy temperature by 4.8°C. These physiology changes adversely affected seed numbers (52%), and yield (47%) under WD, indicating a greater sensitivity of reproductive stage to short-term WD. Our findings provided insight into the resilience mechanisms of cowpeas under WD conditions.

Presenter: Mohan Kumar Bista

Presentation Session: MO7

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa

Title: Resilience of finger millet to drought stress during the reproductive stages

Abstract: Finger millet (Eleusine coracana L.) is a C4 annual coarse cereal with several stress-resilient and nutraceutical traits. Despite the growing popularity of this crop, research on finger millet's performance in hot and arid conditions is notably sparse. In this study, we analyzed 498 finger millet accessions under Mississippi's marginal soils, characterized by high temperatures and low rainfall. Significant genetic variation existed within the USDA GRIN germplasm collection. Over 71% reached flowering, but only 61% produced viable seeds. To further elucidate the sensitivity of growth stages to drought stress (DS), we subjected DS to four selected genotypes for ten days across three critical reproductive stages: panicle development (DS1), flowering (DS2), and grain filling (DS3). The chlorophyll index declined under drought but fully recovered after 10 d pf rewatering, while stomatal conductance showed varying recovery levels. Drought significantly reduced grain yield, with losses of 34% during grain filling, 33% during flowering, and 16% at panicle development, indicating the necessity of strategic irrigation timing. However, the impact of DS on harvest index at all stages was significantly low compared with effects on yield, highlighting the need to optimize crop morpho-physiology for drought resilience. These findings advocate for the potential of finger millet as a viable alternative to traditional cereals in rainfed agricultural systems. Integrating tolerance and resilience mechanisms or adaptive traits may be pivotal for developing drought-tolerant cultivars in this promising crop.

Presenter: Alekhya Chakravaram

Presentation Session: MO7

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa, Assistant Research Professor

Title: Assessing natural diversity in finger millet for physiological and agronomic traits

Abstract: Finger millet (Eleusine coracana), a C4 cereal crop, has gained attention for its resilience to harsh climatic conditions. Widely consumed as a staple food in Africa and Asia, it is highly valued for its rich nutritional composition, including essential minerals, vitamins, and dietary fiber. While its presence in developed regions like the USA remains limited, recent studies have begun investigating its adaptability and potential integration into sustainable agricultural systems. This study examines the genetic diversity of physiological, agronomic, and yield-related traits across 317 finger millet genotypes. Considerable variability was observed in all measured traits, highlighting significant opportunities for genetic improvement. Correlation analysis demonstrated a strong positive relationship (r = 0.51) between tillering and the number of ears, suggesting that selecting for these traits together could enhance yield. Additionally, yield exhibited a positive correlation with the number of ears per plant (r = 0.43), whereas its associations with physiological traits were relatively weaker, indicating their indirect or limited impact on productivity. Principal component analysis (PCA) revealed that yield, biomass, and days to heading contributed the most to overall variation (26.5%), emphasizing the role of productivity and phenology in genetic diversity. Anthocyanin content showed a negative correlation with productivity, indicating potential trade-offs between pigmentation and yield. Among the measured traits, days to heading (21.6%) had the greatest influence on performance, followed by leaf temperature (7.5%), biomass (6.4%), and various yield-related traits (5-6%). Furthermore, physiological attributes such as photosynthetic efficiency (4.5%) and chlorophyll content (4.5%) were identified as key contributors to stress tolerance and overall plant performance. These findings underscore the importance of leveraging genetic variation to improve finger millet's adaptability under changing climatic conditions. Given its potential as a climate-resilient and sustainable crop, integrating phenomics and genomic data can enhance trait selection strategies, reinforcing its significance in global food security amid increasing climatic uncertainties.

Presenter: Durga Purushotham Mahesh Chinthalapudi

Presentation Session: MO7

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Ganapathi Shanmugam

Title: Drought-Induced Shifts in Rhizosphere Microbial Communities Across Developmental Stages of Cowpea Genotypes

Abstract: The increasing global population and climate change pose significant threats to food security, with drought being a critical factor limiting crop productivity. Understanding the interactions between plants and their associated microbiota under drought stress is crucial for developing resilient agricultural practices. This study investigates the impact of drought on the rhizoplane microbial communities of two cowpea (Vigna unguiculata L. Walp.) genotypes, UCR369 and ES4, across different developmental stages. A greenhouse experiment was conducted where both cowpea genotypes were subjected to drought stress at four growth stages: V2 (trifoliate leaf), V4 (branching), R1 (early bloom), and R4 (mid-pod set). Root-associated microbial communities were analyzed using amplicon metagenomics, and functional predictions were made using PICRUSt2. Additionally, community-level physiological profiling (CLPP) was performed using Biolog EcoPlates to assess microbial metabolic activity.

Our results revealed that both genotype and drought significantly influenced the composition of root-associated bacterial communities. Proteobacteria, Actinobacteria, Firmicutes, and Chloroflexi were the dominant phyla, with UCR369 exhibiting a higher abundance of Actinobacteria and Firmicutes under drought conditions compared to ES4. Drought significantly reduced bacterial richness in both genotypes, particularly at the R4 stage in ES4. However, Shannon diversity was not consistently affected by drought. Metabolic activity, measured by average well color development (AWCD), was higher in control plants than in drought-treated plants across all growth stages for both genotypes.

These findings highlight the dynamic nature of root-associated microbial communities under drought stress and their dependence on plant genotype and developmental stage. The study provides insights into how microbial communities adapt to environmental stressors and suggests that enhancing plant-microbe interactions could be a promising strategy for improving crop resilience to drought.

Presenter: Jason Kober

Presentation Session: MO7

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Jagmandeep Dhillon, Assistant Professor, Plant and Soil Sciences

Title: Is it time to reconsider plant populations for top Mississippi corn hybrids?

Abstract: Planting corn (Zea mays L.) at higher plant densities has contributed to increasing grain yield in the U.S. Researchers expect planting densities to reach 123,500 plants ha^{-1} by 2075, considering the historical increase of approximately 1,000 plants ha^{-1} yr^{-1}. Positive hybrid response at higher populations requires greater stress tolerance, which varies by hybrid, management practices, environment, and their interactions. This study evaluated the yield response of four commercially grown hybrids planted at five plant densities (61,750, 74,100, 86,450, 98,800, and 98,800 plants ha^{-1}), replicated across four locations in Mississippi. Hybrids DKC 1627 and 67-44 were grown at all locations, D58VC74 was grown in the irrigated locations (Starkville and Stoneville), and DKC 66-06 was grown in the dryland locations (Verona and Raymond). Under irrigated conditions, yield was affected by a three-way interaction among hybrids, plant densities, and locations. Hybrid D58VC74 yielded the highest at both irrigated locations, producing 15.6 Mg ha^{-1} at 98,800 plants ha^{-1} in Starkville and 15.4 Mg ha^{-1} at 86,450 plants ha^{-1} in Stoneville. Under dryland conditions, yield was not affected by hybrid, but a two-way interaction between location and plant density was observed. In Verona, yield was maximized at 15.5 Mg ha^{-1} when planted at 86,450 plants ha^{-1}. At Raymond, yield was highest at 14.8 Mg ha^{-1} at 98,800 plants ha^{-1}, which was not significantly different from 14.5 Mg ha^{-1} at 61,750 plants ha^{-1}. These findings provide actionable steps for farmers in these regions to optimize yield through ideal hybrid selection and plant density.

Presenter: Lahari Nekkalapudi

Presentation Session: MO7

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Shankar Ganapati Shanmugham

Title: Optimizing Nitrogen and Cover Crop Practices to Improve Soil Health and Microbial Communities in Sweet Potato Production

Abstract: Mississippi, the third-largest, sweet potato producer in the United States, requires adequate nitrogen (N) to improve yields and maintain sustainable environment. Microorganisms, including bacteria and fungi, play a crucial role in regulating N availability from soil, organic matter, and crop residues. However, limited research exists on soil microorganisms' role in improving soil health with cover crops in sweet potato production. Therefore, a field study was conducted at Pontotoc Ridge-Flatwoods Branch Experiment Station in Pontotoc, Mississippi to assess the effects of cover crops on N availability in sweet potato. This study was conducted using a randomized block design with a split-block arrangement, replicated four times, and included three N treatments (0, 50, and 100 lb-1) and three cover crop treatments (no cover crop, winter wheat, and clover). Cover crops planted in fall and terminated in spring before planting sweet potato. Soil samples were collected at planting and after harvesting of sweet potato and termination of cover crops and analyzed for both physical and chemical properties. Amplicon targeting the bacteria (16s) and fungal (ITS) were sequenced for soil microbiome characterization. DNA sequence data was analyzed using QIIME (Quantitative insights into microbial ecology). R statistical software was used for analyzing the data. Cover crop treatments showed significant difference in measured soil permanganate-oxidizable carbon (PoXC). Specifically, clover cover crop treatment showed significantly higher soil PoXC levels than the control (fallow) treatment. Sequencing data revealed significant differences in microbial diversity among N treatments, with notable effects on Shannon diversity ($p = 0.0326$) and Chao1 richness ($p = 0.0080$) at the preplant stage. ITS data also showed significant N-related differences in Shannon diversity ($p = 0.0224$). Cover crop treatments significantly influenced microbial diversity, with changes in Shannon diversity ($p = 0.0035$) and Chao1 richness ($p = 0.0197$) at the preplant stage, and further significant impacts on Chao1 richness at post-termination ($p = 0.0033$) and harvest ($p = 0.0006$). Beta diversity analysis revealed significant effects of nitrogen and cover crop treatments. Pre-planting 2023 nitrogen treatments showed a significant difference ($p = 0.001$). Cover crop treatments significantly impacted beta diversity at preplant ($p = 0.002$), ITS preplant ($p = 0.001$), post-termination ($p = 0.013$), and harvest ($p = 0.001$). In conclusion, both nitrogen and cover crop treatments significantly influenced soil microbial diversity and soil health, with cover crops, particularly clover, enhancing soil permanganate-oxidizable carbon levels and driving notable shifts in microbial community structure across different growth stages of sweet potato production.

Presenter: Jasmine Sahota

Presentation Session: MO7

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Ganapathi Shanmugam, Assistant Research Professor, Plant and soil sciences

Title: Utilizing Insect Frass: A Sustainable Approach to Organic Fertilization in Agriculture

Abstract: The growing use of insects for food and feed produces a high number of byproducts, known as insect frass. Insect frass is a mixture of insect excreta, shed exoskeletons, and undigested feed. Insect frass is gaining attention as a potential organic amendment due to its rich macronutrient (N, P, K), micronutrient, and microbial consortia. However, only a few studies have thoroughly examined the effect of soil amendment with insect frass on rhizosphere microbial communities and plant growth. The objective of this study is to investigate how diet source, origin (insect species), type (frass) combination affects frass-associated microbe and how it affects plant growth when applied as a soil amendment. A greenhouse trial, using a completely randomized design evaluated soil amendments with frass originating from two insect species (Acheta domesticus and Hermetia illucens) at five different rates (0, 50, 100, 250 lb/ac) compared to mineral fertilizer using corn as modal plant. We employed 16S rRNA (bacterial) and ITS (fungal) amplicon sequencing to characterize the frass associated microbial community composition. Additionally, we used Biolog EcoPlates to measure microbial metabolic activity by assessing average well color development (AWCD). Results showed significant differences in microbial diversity and community structure based on origin and diet sources. Frass amendment rates significantly influenced aboveground biomass ($p < 0.05$), with higher rates correlating with increased biomass. AWCD analysis indicated that frass amendments altered microbial metabolic activity. Principal Component Analysis (PCA) revealed distinct microbial community clustering based on frass origin, highlighting its role in shaping soil microbial composition. These findings demonstrate that insect species and diet sources influence frass quality, which in turn affects the aboveground-belowground feedback loop. Understanding these dynamics is crucial for optimizing insect frass as a biofertilizer.

Presenter: Andres Arias-Londono

Presentation Session: MO8

Level of Study: PhD

Department: Aerospace Engineering

Category: Engineering

Advisor: Dr. Chuangchuang Sun, Assistant Professor - Aerospace Engineering department

Title: Multi-task Learning for Rapid Online Adaptation under Signal Temporal Logic Specifications in Autonomous Systems

Abstract: In this session, a Multi-Task Learning (MTL)-based control framework that considers Signal Temporal Logic (STL) specifications is presented. The main goal is to improve the generality of the controller in new tasks, exploiting useful information incorporated in related tasks. MTL settings involve learning and testing stages. In the learning stage, an ensemble of tasks is generated by perturbing STL specifications. Task compliance is measured via the robustness degree, which is computed using the STL semantics. In the testing stage, new unseen tasks are generated. The solution from multitask learning is used as a warm-start, leading to fast, few-shot adaption to new tasks. Both stages, learning and testing are solved using Sequential Convex Programming to deal with the non-convex nature in the robustness degree expression. The methodology is applied to the system dynamic of a quadcopter within a scaled framework of the Air Traffic Control problem.

Presenter: Cassia Brocca Caballero

Presentation Session: MO8

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Vitor S. Martins, Agricultural & Biological Engineering

Title: Mapping Water Quality in the Mississippi Sound: Remote Sensing and Machine Learning for Multi-Parameter Assessment

Abstract: The Mississippi Sound, a vital and productive ecosystem supporting diverse marine life and economic activities, experiences significant water quality (WQ) challenges threatening its ecological health and economic value. WQ issues concern resource managers, industries, and communities, emphasizing the need for effective monitoring and conservation strategies for water resources. Traditional point sampling methods are costly and limited in spatial coverage, making them insufficient for comprehensive assessments. In contrast, remote sensing technologies provide a tool for large-scale, continuous monitoring of key WQ parameters such as chlorophyll-a, total suspended solids, water clarity, and turbidity. This study utilizes the Ocean and Land Colour Instrument (OLCI) aboard the Sentinel-3 satellite to create an integrated framework combining satellite imagery, in-situ data, and machine learning (ML) algorithms for monitoring and mapping WQ in the Mississippi Sound. We developed empirical ML models with in situ data on reflectance and WQ parameters collected in eight field campaigns conducted between July 2023 and October 2024. We applied them to four Sentinel-3 OLCI images, successfully validating our results with in-situ measurements. This research enhances our ability to monitor coastal water quality on a large scale. Integrating satellite data and in-situ records expands the efforts on WQ monitoring, offering a cost-effective alternative to traditional field-based methods. These findings can support coastal management strategies, providing information for more informed decision-making and conservation efforts. Ultimately, these results will be integrated into an interactive data portal, providing real-time, accessible water quality data over the Mississippi Sound for stakeholders and decision-makers.

Presenter: Amirhossein Eskorouchi

Presentation Session: MO8

Level of Study: PhD

Department: Industrial and Systems Engineering

Category: Engineering

Advisor: Dr. Haifeng Wang, Assistant Professor, Industrial and Systems Engineering

Title: Knowledge-Informed Learning for Automated Detection of Extracapsular Extension in Head and Neck Cancer

Abstract: Effective diagnosis and treatment planning for head and neck squamous cell carcinoma (HNSCC) heavily depend on identifying extracapsular extension (ECE) within lymph nodes, a critical factor in predicting patient outcomes. Current ECE detection methods often depend on visual identification and pathology confirmation, which are time-consuming, error-prone, and lack explainability. This study introduces a knowledge-informed deep learning (KIDL) framework designed to optimize ECE prediction by embedding domain-specific anatomical knowledge directly into the training process. Central to this framework is a 3D DenseNet-based informed-decoder, which generates binary masks highlighting clinically relevant regions, while simultaneously leveraging latent space representations for ECE classification. The framework employs a knowledge-regularized loss function to enforce alignment between predictions and expert-defined regions of interest, reducing false positives and enhancing interpretability. The proposed KIDL framework was evaluated on CT scans from 98 patients using a five-fold cross-validation approach. The model demonstrated an accuracy of 80%, an area under the receiver operating characteristic curve (AUC) of 83%, and a specificity of 88%. These results illustrate the balance of the framework in predictive performance with interpretability.

Presenter: Diego Galindo

Presentation Session: MO8

Level of Study: Master's

Department: Civil and Environmental Engineering

Category: Engineering

Advisor: Dr. John J. Ramirez-Avila, Professor, Richard A. Rula School of Civil and Environmental Engineering

Title: Temporal analysis of curve number across the united states: Implications of climate change

Abstract: This study focuses on the temporal analysis of Curve Numbers (CN) across the United States to evaluate changes over time and investigate potential connections to climate change. The research examines CN trends in two temporal frameworks: annually and seasonally (fall, winter, spring, and summer). CN values were calculated using precipitation and runoff datasets from monitoring stations in all U.S. states, employing the Least Squares Estimation (LSE) method. In addition to CN, the maximum, mean, and median values of precipitation and runoff were determined for both temporal groups to further understand the hydrological characteristics influencing CN.

Trend analysis was conducted using the modified Mann-Kendall trend test to identify statistically significant patterns in CN values for the yearly and seasonal datasets. For cases where no trend was detected, data smoothing was applied using the Locally Weighted Scatterplot Smoothing (LOWESS) method. The optimal smoothing factor was determined through cross-validation to ensure robust and accurate results.

The study provides valuable insights into the spatiotemporal dynamics of CN, revealing how it varies across different states and time periods. Findings highlight the potential impacts of climate variability and anthropogenic changes on hydrological conditions in the United States. These results are critical for improving hydrological modeling, supporting water resource management, and developing climate change adaptation strategies. By bridging temporal and spatial analyses, this research contributes to a deeper understanding of CN behavior and its implications for sustainable water management in a changing climate.

Presenter: Dakota Hester

Presentation Session: MO8

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Vitor S Martins, Assistant Professor, Agricultural and Biological Engineering

Title: Learning with less: high spatial resolution land cover classification under label-scarce conditions with large-scale self-supervised pre-training and transfer learning.

Abstract: Land cover data is a key component of environmental analysis and informs decision making in agriculture, urban planning, hydrology, and other applied domains. Most publicly available land cover products are produced at a coarse resolution due to the inherent difficulty in classifying high resolution data. Deep learning semantic segmentation models have been shown to be performant for such tasks but require large amounts of fully annotated tiles for training. This is problematic for land cover classification due to the expense and difficulty of annotating such data at scale. In our approach, we initially pre-train a ResNet-152 model on 377,913 unlabeled images using a denoising autoencoder to enable spatial feature extraction without the need for labeled data. This model is used as an encoder in a U-Net architecture where fully supervised pre-training is performed using 10,220 labeled images from another region. Finally, we fine-tune the U-Net with only 119 labeled images over the state of Mississippi. When applied to 1-meter imagery in Mississippi, our model achieves over 80% accuracy despite limited region-specific labeled data. While the lack of ground truth data makes certain visually intricate classes difficult for the model to capture with a high degree of precision (such as cultivated crops), a visual assessment of the resulting land cover product indicates accurate delineation of forested areas, impervious surfaces, open water, and herbaceous regions. Our proposed approach can enable high-resolution land cover classification at scale while minimizing the need for human annotation to produce ground truth data.

Presenter: Thainara Lima

Presentation Session: MO8

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Vitor Martins, Assistant Professor, Ag & Bio Engineering

Title: A global Spectral Bandpass Adjustment Function (SBAF) to build Harmonized Landsat-Sentinel over Inland and Coastal Waters

Abstract: Satellite imaging systems are widely used in water quality management, providing valuable insights into optically active constituents like sediments, chlorophyll-a, and dissolved organic matter through spectral water reflectance. These environments are characterized by highly dynamic patterns influenced by factors such as currents, winds, tides, and seasonal variations, which directly impact the distribution of algal blooms, turbidity, temperature, and suspended matter, often exhibiting significant variability over short time scales. In this context, Landsat 8/9 and Sentinel-2 are the most relevant medium spatial resolution data sources for aquatic applications, and integrating these spectral images into a single product constellation offers significant potential for monitoring dynamic processes over coastal and inland waters. To ensure compatibility and consistency in harmonized products for aquatic studies, we present a novel pipeline for harmonizing multi-sensor data from Landsat and Sentinel satellites for global aquatic monitoring. This study analyzes 4,047 atmospherically corrected match-ups of Landsat-8/9 OLI and Sentinel-2 A/B MSI images over inland and coastal waters to develop a new spectral bandpass adjustment function (SBAF) for aquatic studies. We demonstrated the application of SBAF by comparing spectral reflectance from Landsat and Sentinel-2 before and after cross-calibration. Our findings highlight the effectiveness of the SBAF coefficients in reducing spectral discrepancies between the two datasets. By combining the strengths of both Landsat and Sentinel-2, our method aims to generate consistent, spatially, and temporally coherent water-leaving reflectance products, supporting the derivation of critical biogeochemical variables in coastal and inland waters.

Presenter: Jesus Ortiz

Presentation Session: MO8

Level of Study: Master's

Department: Rula School of Civil and Environmental Engineering

Category: Engineering

Advisor: John Ramirez Avila, Professor, Rula School of Civil and Environmental Engineering

Title: Regional Variability in Curve Number Adjustments: Evaluating Linear and Exponential λ Conversion Models

Abstract: The Soil Conservation Service Curve Number (SCS-CN) method is a widely recognized model for estimating surface runoff based on factors such as rainfall, land conditions, and soil hydrological properties, typically using a default initial abstraction ratio (λ) of 0.2. However, empirical studies indicate that Curve Number (CN) values derived from rainfall-runoff data often deviate from established tabulated values. Research has demonstrated that (λ) variability is not standardized and is highly specific to regional characteristics, influenced by soil type and rainfall intensity (Abderraman R. Amorim Brandão, 2024). Recent evidence suggests that reducing λ to 0.05 can significantly enhance the accuracy of runoff predictions under certain hydrological conditions, highlighting the need for refined, (λ)-specific conversion equations.

This study investigates both linear and exponential conversion equations for various regions in the U.S. (West, Southwest, Northwest, Southeast and Northeast), employing λ calibration from 1,359 monitoring stations across diverse conditions and methodologies, including Least Squares Estimation and Asymptotic methods. The analysis processed rainfall-runoff discharge datasets under different scenarios: depths exceeding 0 mm and those greater than 25.4 mm, further categorized by order of frequency. The linear and exponential approaches examined in this study demonstrated improved performance in metrics such as R^2 and Root Mean Squared Error (RMSE) for λ conversion accuracy, in contrast to the general conversions proposed by Woodward et al. (2003) and Lasco, J. D. D., & Moglen, G. E. (2023), which do not consider regional variability. This research underscores the importance of site-specific regional calibration and identifies methodological challenges that must be addressed to generalize λ conversion improvements across varied hydrologic contexts.

Presenter: Pratyush Dhungana

Presentation Session: MO9

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Krishna P. Poudel, Associate Professor, Department of Forestry

Title: County Level Aboveground Forest Biomass Estimation Using Remote Sensing Derived Auxiliary Information

Abstract: National forest inventories, such as the USDA Forest Service's Forest Inventory and Analysis (FIA) program, often lack sufficient sample for precise estimates of forest attributes like aboveground biomass at smaller domains (e.g., counties). Small area estimation (SAE) methods have the potential to improve precision of these estimates by leveraging auxiliary information. Area-level SAE models, such as the Fay-Herriot (FH) model, are particularly useful for forestry data as they rely on area-level covariates rather than individual-level data, improving precision over direct estimates. However, the standard FH model assumes no error in auxiliary variables, which can lead to overly optimistic estimates, especially when using remote sensing data prone to measurement errors. Additionally, the spatial dependence in forest attributes like biomass can increase uncertainty of these estimates. This study addresses these limitations by incorporating measurement errors and spatial dependence into FH models for estimating county level forest biomass. These models are compared with standard FH and direct estimates across four FIA units in the contiguous United States. Using open-source remote sensing data as auxiliary variables and FIA aboveground biomass density estimates as the response variable, we found that the Spatial FH model marginally outperforms the standard FH model in domains with significant spatial dependence (Mississippi; RRMSE: 0.60 vs. 0.61). The measurement error FH model consistently yields lower coefficients of variation (CV) and RRMSE < 1 across all states. Our results show that including spatial dependence and addressing measurement errors yield realistic precision gains in small domain forest biomass estimation using SAE.

Presenter: Elizabeth Esser

Presentation Session: MO9

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Ashley Schulz, Assistant Professor, Department of Forestry

Title: Early findings in the hunt for autotoxic methods to control cogongrass (Imperata cylindrica)

Abstract: Cogongrass (Imperata cylindrica) is one of the worst invasive plants that threatens the health of many important ecosystems in the southeastern United States. Current cogongrass control methods are ineffective and can unintentionally harm native plants, necessitating the development of alternative methods. This research seeks to determine the potential to harness autotoxicity, or toxicity from compounds produced by cogongrass itself, for cogongrass management. To extract chemicals from cogongrass, we soaked cogongrass leaves and rhizomes (underground stems) separately in water for 72 hours. These extracts or a water-only control were applied to the leaves or soil of cogongrass and two native plants (longleaf pine and blackberry) to determine impacts on plant growth. Treatments were applied twice: at the beginning of the experiment and one week into the experiment. We measured the growth of each plant using daily measurements of plant length and the number of leaves. Twenty-one days after the first treatment, we measured the aboveground and belowground biomass of each plant. There was no statistically significant difference in plant growth or final biomass for any of the three plant species, but data trends show that cogongrass rhizome extract applied to the soil reduced cogongrass growth compared to the control and leaf extract treatments. This suggests that chemicals derived from the rhizome could reduce cogongrass growth without harming native plants. Future studies will explore the effect of different concentrations of rhizome extracts on cogongrass to determine if higher concentrations could provide more effective management.

Presenter: Jianing Liang

Presentation Session: MO9

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Courtney Siegert, Professor, Department of Forestry

Title: A Meta-analysis of Afforestation on Soil Greenhouse Gas Emissions

Abstract: Afforestation is a natural climate solution and a key strategy to mitigate climate change. While tree planting primarily achieves this mitigation via above-ground carbon sequestration, soils also play a dual role as sources and sinks of greenhouse gases (GHG). Understanding tree planting impacts on soil GHG flux is essential for leveraging afforestation to combat global warming. In this research, we conducted a global meta-analysis of 157 studies to assess tree planting effects on soil GHG emissions across different prior land uses and to identify key emission drivers. Our findings showed that afforestation significantly reduced CO2 emissions in former grasslands and deforested land. CH4 emissions decreased across most prior land uses, except grasslands, while soil N2O flux was mostly unaffected. The type of planted forest also influenced soil GHG emissions. Hardwood planting reduced CH4 emissions, but no clear trends emerged for N2O emissions from softwood or hardwood forests. Tree planting density did not affect GHG flux. GHG responses to afforestation also changed over time and were influenced by environmental factors. CO2 emissions correlated positively with soil organic carbon, mean annual precipitation, C: N ratio, and soil temperature. N2O flux increased with soil NO3- and microbial nitrogen and decreased with soil organic carbon and moisture. Additionally, soil microbial biomass carbon and soil organic carbon were positively correlated with CH4 emissions. These findings highlight the importance of selecting tree species, site conditions, and environmental factors to optimize afforestation's GHG mitigation potential, informing better management decisions to enhance its role as a climate solution.

Presenter: Samjhana Panthi

Presentation Session: MO9

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Eric McConnell, Department of Forestry

Title: Determining vertical price transmission relationship in the timber supply chain in the Unites States South using STAR model

Abstract: This study investigates vertical price transmission in the U.S. South timber market, focusing on stumpage, log, and lumber price relationships. It extensively reviews the literature on vertical and horizontal price transmission in the timber market to understand the market dynamics in the timber industry. The study utilized quarterly stumpage, delivered, and lumber price data to find the vertical market linkage in the timber supply chain. Data for this study covered from the first quarter of 1982 (1982Q1) to the second quarter of 2022 (2022Q2). Using a Smooth Transition Autoregressive (STAR) model, this research analyzes how price changes in the supply timber chain, emphasizing the complexities of non-linear dynamics. The results revealed that log-lumber and stumpage-lumber price relationships demonstrate non-linear behaviors, making the STAR model an effective tool for capturing the timber market dynamics. The price transmission was linear in the lower regime in the log-to-lumber stage, while a non-linear relationship was dominant in its higher regime. Asymmetric price transmission was observed in the stumpage-to-lumber stage, indicating inefficient market operations. These findings provide critical insights into how price adjustments occur across the timber supply chain and highlight the importance of the non-linear STAR model.

Presenter: Nasir Qadir

Presentation Session: MO9

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Krishna P. Poudel

Title: Developing aboveground biomass models for hardwood species in conservation reserve program practices with trees

Abstract: The Conservation Reserve Program (CRP) is an initiative of the United States Department of Agriculture aimed at conserving environmentally sensitive lands. In addition to reducing soil erosion and enhancing wildlife habitat, CRP tree plantings have the potential to sequester significant amounts of carbon. Therefore, accurate estimation of aboveground biomass in CRP lands is important for assessing the comprehensive benefits of this program. Since the trees in CRP land show significantly different growth rates and stand dynamics, allometric models developed for traditional forests are not accurate for CRP trees. In this study, allometric models were developed to estimate tree aboveground biomass and its component hardwood species in CRP lands. Data were collected by destructively sampling 12 trees at various CRP sites. Significant differences were observed in predicted biomass from models developed for traditional forests and CRP trees. Furthermore, the predictive performance improved significantly with the inclusion of an additional variable, as shown by higher R2 values and small mean absolute error and root mean square error compared to the base model.

Presenter: Arpita Deb

Presentation Session: MP1

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Barbara L. F. Kaplan, Associate Professor, Comparative Biomedical Sciences

Title: Investigating aryl hydrocarbon receptor (AHR) ligands effect on IgG2a- and IgG2b-triggered signaling in innate cells

Abstract: Multiple sclerosis (MS) is an autoimmune disorder characterized by the demyelination of neurons in the central nervous system. Experimental autoimmune encephalomyelitis (EAE) is a MS mouse model that can be induced by injecting mice with myelin oligodendrocyte glycoprotein (MOG). In EAE, MOG-specific IgG antibodies can potentially be pathogenic by recruiting cytolytic cells to destroy MOG-expressing cells comprising myelin. Our pilot studies have shown that the aryl hydrocarbon receptor (AHR) ligand 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) suppressed MOG (disease)-specific IgG2a and IgG2b antibody production in EAE. Our next objective was to determine if TCDD and other AHR ligands also inhibit IgG2a- and IgG2b-mediated signaling in innate cells. We hypothesized that other non-toxic AHR ligands would suppress IgG2a and IgG2b antibody production in vivo and subsequently suppress IgG2a- and IgG2b-triggered signaling in innate cells. We first induced EAE in female C57BL/6 mice and orally gavaged them with the nontoxic AHR ligand indole-3-carbinol (I3C). We found that I3C suppressed MOG-specific IgG2a and IgG2b in EAE. We then designed an approach to induce IgG2a and IgG2b-triggered signaling in vitro using two different IgG-immune complexes: streptavidin-biotinylated IgG2a (Strept-Biotin IgG2a) and Strept-Biotin IgG2b. Our ELISA analysis results showed Strept-Biotin IgG2a failed to stimulate any immune response, whereas Strept-Biotin IgG2b increased the release of IL-6 and TNFα cytokines, and C3a complement protein in innate cells. Next, cells were treated with AHR ligands to assess if the IgG2b-triggered signaling was compromised. Our data indicated that the I3C and 2-(1H-Indol-3-ylcarbonyl)-4-thiazolecarboxylic acid methyl ester (ITE), which is an endogenous AHR ligand, were successful in mitigating the immune responses. Together our results provide evidence that the Strept-Biotin IgG2b immune complex formation effectively activated innate cells and nontoxic AhR ligands might suppress the immune response by suppressing the pathogenic antibody signaling.

Presenter: Yasas Gamagedara

Presentation Session: MP1

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Nuwan Wijewardane, Assistant Professor, Agricultural and Biological Engineering

Title: Enhancing Soil Property Prediction Accuracy Using Calibration Transfer in Mid-Infrared Diffuse Reflectance Spectroscopy

Abstract: Mid-infrared spectroscopy offers a cost-effective and lab/portable solution for rapid soil property assessment. However, the new spectrometers often require extensive training datasets, making it essential to leverage existing global or regional spectral libraries. This study aimed to (i) evaluate the performance of models calibrated on global or regional spectrometers in predicting new spectra from regional spectrometers (lab/portable) and (ii) assess calibration transfer techniques, including spectral pre-processing (PP) and model transfer (MT), to enhance predictions of soil properties such as organic carbon, total carbon, calcium, pH, cation exchange capacity, silt, and sand. Baseline correction (BC) and standard normal variate (SNV) were used as PP techniques, while spiking with extra weight was applied for MT. The global dataset (n=2,534) from Mississippi (MS) and Texas (TX) was sourced from the USDA Kellogg Soil Survey Laboratory and scanned with the Vertex-70 spectrometer. The regional dataset (n=1,571) included locally collected samples from MS and TX, scanned with Alpha II-DRIFT, Alpha II-Front Reflection, and ARCoptix Rocket. Principal component analysis revealed significant spectral variations among spectrometers and the combined PP-MT approach consistently improved model performance across all soil properties and cross-spectrometer schemes compared to calibration transfer techniques alone. Cross-spectrometer schemes with the PP-MT approach yielded R^2 values comparable to or higher than within-spectrometer schemes. These findings highlight the potential of integrating PP and MT techniques to improve soil property predictions across spectrometers, supporting precision agriculture and soil management in the field.

Presenter: Fenny Patel

Presentation Session: MP1

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hasan Tekedar, Assistant Research Professor, Comparative Biomedical Sciences, College of Veterinary Medicine

Title: Single-cell RNA transcriptomics of channel catfish gills response to virulent Aeromonas hydrophila infection

Abstract: The channel catfish, Ictalurus punctatus, is an essential species in aquaculture, with global production expanding in countries such as China, Mexico, and Cuba. One of the most significant challenges to its sustainability is infection by Aeromonas hydrophila, a gram-negative opportunistic bacteria responsible for motile aeromonas septicemia. This infection leads to gill damage, organ necrosis, and high mortality in catfish. The gills, critical for physiological processes such as gas exchange, osmoregulation, and immune defense, are particularly vulnerable to A. hydrophila infections, making them a key target for understanding the disease's complexity. We utilized single-cell RNA sequencing (scRNA-seq) to analyze gill tissue from channel catfish infected with virulent A. hydrophila ML09-119. ScRNA-seq offered a detailed examination of the cellular dynamics during A. hydrophila infection. We developed a method for preparing catfish gill cells designed explicitly for scRNA-seq. Fish challenge experiments were performed with control and wild-type A. hydrophila (vAh ML09-119). Catfish fingerlings were exposed to the LD50 dose for vAh ML09-119 through a 3-hour bath immersion at 30°C. After an 8-hour exposure period, fish cells were collected. Subsequently, scRNA-seq data analysis was conducted using the CellRanger pipeline with the Seurat package in the R programming. Principal components were calculated, followed by Uniform Manifold Approximation and Projection calculations and clustering. ScRNA-seq enabled the detection of rare subpopulations of catfish cells and a quantitative assessment of expression changes during active infection cycles. The analysis identified 19 novel cell clusters with unique gene expression signatures. These findings contribute to understanding A. hydrophila infections in channel catfish gill cells. These findings will play a pivotal role in development of strategies to improve disease resistance in aquaculture.

Presenter: Bipin Paudel

Presentation Session: MP1

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Heidi Renninger, Department of Forestry

Title: Predicting Leaf Area in Eastern Cottonwood and Poplar Hybrids Using Allometric and Site Data Across Diverse Experimental Sites.

Abstract: Leaf area, as the fundamental plant-environment interface, is critical for understanding short-rotation woody crops like poplars' inherent capacity to capture light, produce biomass, and sequester carbon. In this study, we developed a model to predict the leaf area of eastern cottonwood and its hybrids using data from 208 trees across six experimental sites in Mississippi. Allometric variables—diameter at breast height (DBH), tree height (H), basal area (BA) – and categorical variables —taxa and site—were used in model development. Initial quantitative models (using only allometric variables) showed poor performance ($R^2 < 0.20$), but incorporating categorical predictors significantly improved explanatory power ($R^2 = 0.50$-0.66). Models obtained through backward-stepwise selection were then augmented with qualitative predictors followed by transformation techniques which led to the linear fixed effect model (LFEM). The analysis was refined using site as a random effect that resulted in the linear mixed effect model (LMEM). To ensure model reliability, we implemented K-fold cross-validation. The LFEM, using DBH, taxa, and site as predictors, achieved an $R^2 = 0.7162$, RMSE = 2.9105 m^2, and MAE = 1.9916 m^2. The LMEM yielded a marginal $R^2 = 0.3771$, conditional $R^2 = 0.8022$, RMSE = 2.9226 m^2, and MAE = 1.9969 m^2. While both models showed similar performance metrics, the LMEM demonstrated a slight advantage in explaining variance when considering both fixed and random effects. The study reveals that integrating allometric and categorical variables significantly enhances leaf area prediction models for eastern cottonwood across experimental sites.

Presenter: Rejane S. Paulino

Presentation Session: MP1

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Vitor S. Martins, Professor, Agricultural & Biological Engineering (ABE)

Title: Assessment of glint correction algorithms for Sentinel-3 OLCI over Mississippi Sound

Abstract: Sentinel-3 A/B satellites are collecting 300m daily multispectral data in sun-synchronous orbits around the Earth and were designed specifically for studying ocean colors. The Ocean and Land Colour Instrument (OLCI) sensor aboard the satellite is well-suited for monitoring various features of coastal water, such as chlorophyll levels, harmful algae blooms, turbidity, and organic matter concentration. Nevertheless, spectral water-leaving radiance measured by satellite sensors is highly affected by atmospheric interference, adjacency effects from land targets, and ocean surface conditions, such as sky- and sun-glint effects. Sky- and sun-glint effects are caused and intensified by water surface waves and image acquisition geometry, denoting the reflection of the sky and sunlight from the water's surface, and these effects must be corrected to derive the spectral watercolor features accurately. In this study, we evaluated three glint correction methods for Sentinel-3/OLCI images acquired over Mississippi Sound. Four Sentinel-3 images were acquired at Top-of-Atmosphere (TOA) radiance, and atmospheric effects were corrected using the 6SV radiative transfer model. Three empirical methods were applied to correct the glint effects: a simple subtraction of reflectance values from reference bands (1,020 nm), an assumption with the oxygen absorption band, and an approach based on Fresnel reflectance and geometry. To validate the correction framework, in-situ remote sensing reflectance spectra (n=40) were collected on the same day as the satellite overpass in February, April, August, and October/2024. The spectral bands in the green (510-560 nm), orange (620 nm), red (665-681 nm), and red-edge (709 nm) wavelengths showed high consistency with in-situ observations. However, the blue band (490 nm) performed poorly in most cases. These results suggest that Sentinel-3/OLCI is highly capable of capturing watercolor features, particularly within the 510 to 709 nm range. The validation across different times highlights the importance of glint correction for understanding spectral-temporal dynamics in coastal waters.

Presenter: Mohammad Abdus Shahid Rafi

Presentation Session: MP1

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. John Ball, Professor, Electrical and Computer Engineering

Title: Employing UAS-based GNSS-R, LiDAR, and multispectral data for soil moisture estimation: insights from a three-year field study.

Abstract: Accurate and high-resolution soil moisture (SM) estimation is an essential part for site-specific precision agriculture (PA) to optimize irrigation planning and management, enhance crop yields and quality, and conserve environmental resources. However, achieving detailed SM measurements at a sub-field scale remains a significant challenge. Unmanned Aircraft Systems (UAS) provide a viable solution by enabling efficient, high-resolution spatially distributed SM observations. While satellite-based microwave remote sensing is widely used for large-scale SM retrieval, its spatial resolution is insufficient for localized agricultural applications. This study introduces a UAS-based passive Global Navigation Satellite Systems Reflectometry (GNSS-R) technique to generate high-resolution SM maps tailored for PA. The proposed approach utilizes custom-built UAS platforms equipped with a low-cost GNSS receiver and ancillary sensor systems. Over three years, data were collected across a 2.31-hectare corn and cotton field, integrating GNSS-R, multispectral imaging, LiDAR (Light Detection and Ranging), and in-situ SM measurements. This study evaluates the influence of receiver antenna characteristics, surface conditions, and GNSS constellations on GNSS-R measurements. Additionally, it explores relevant feature selection and normalization techniques critical for accurate SM estimation. The findings highlight both the potential and the challenges of UAS-based GNSS-R for high-resolution SM mapping, demonstrating its potential as a reliable solution for site-specific PA applications.

Presenter: Asifur Rahman

Presentation Session: MP1

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Hussein Gharakhani, Assistant Professor, Agricultural and Biological Engineering

Title: Developing a UGV Rover with Reconfigurable Chassis to Collect Plastic Contaminant from Cotton Fields

Abstract: Plastic contamination in cotton fields poses a significant challenge to cotton production. After getting into the ginning process, the plastics get torn into very small pieces. Making it almost impossible to separate from fiber, leading to degraded cotton quality. Approximately 20% of the plastic contamination originates from the plastics left in the field. To address this issue, we are developing a collaborative UAV-UGV robotic system capable of scouting cotton fields, mapping plastic contaminant locations, and collecting them. For the UGV part, we have selected an Amiga (Farm-ng, USA) robot and developed an over-the-row chassis for that such that it can encompass two rows of cotton. The reconfigurable chassis enables the UGV to accommodate various plant heights and row spacing. The wheels' motors are controlled through an NVIDIA Jetson AGX computer. There are also two depth cameras in the back and the front for navigation purposes. A GPS sensor and IMU will be added in the next step to enhance navigation performance.

Presenter: Azeezat Faderera Abdulraheem

Presentation Session: MP2

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Todd Mlsna, Professor, Chemistry

Title: Synergistic adsorption of Pb (II) from aqueous solution using calcined biochar-bentonite clay hybrid

Abstract: The biochar-bentonite clay hybrid was prepared by coprecipitation with the goal of producing a material that can remove Pb (II) from aqueous solutions effectively. Incorporating bentonite clay onto the Douglas fir biochar (DFB-BTC) surface significantly improved the adsorption capacity by introducing more active sites, strengthening the structural properties, and promoting strong adsorbate interactions. The point of zero charge of the adsorbent was slightly higher than that of the pristine DFBC. All sorption experiments were performed at pH 5, and the system obeyed the Langmuir adsorption isotherm. The highest Langmuir adsorption capacities observed at 298, 308, and 318 K were 48, 80, and 78 mg/g, respectively, with 99.85% as the highest removal efficiency. The sorption kinetics showed that equilibrium was reached after 2h for both 5 and 50 mg/L Pb(II) solutions, whereas equilibrium was attained after 4h for 100 mg/L, which fit a pseudo-second-order model. The surface characterization was determined using scanning electron microscopy (SEM), X-ray diffraction (XRD), BET, and FTIR. This study aimed to develop a facile, eco-friendly, versatile, low-cost, and hybrid biochar-bentonite clay (BBC) for an exhaustive evaluation of Pb (II) uptake in water.

Presenter: Malki Omesha Perera

Presentation Session: MP2

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sidney Creutz

Title: Novel Synthesis of Yttrium Alloyed La2S3 Nanocrystals

Abstract: Rare-earth (RE) chalcogenides exhibit unique properties that are valuable for a wide range of applications, including optoelectronics and photovoltaics. $LaYS_3$ has been identified as a promising wide band-gap photoabsorber material through computational screening with a band-gap of 2.0 eV which is ideal for photovoltaics applications. This material has only been synthesized in solid form at high temperatures (1000 °C).

Further, the photoluminescence of RE ions arises from electronic transitions within the 4f orbitals, which are LaPorte forbidden, leading to inherently weak absorption and low emission intensity. As a result, direct excitation of RE ions is ineffective unless they are doped into a suitable host material to assist in energy absorption. La_2S_3 is assumed to be an excellent host material for the doping of RE ions with optical and magnetic activity.

In this work, we present an efficient method for synthesizing La_2S_3 and $(La_{1-x}Y_x)_2S_3$ colloidal nanocrystals. Wet chemical, solution-processable methods are employed, wherein all precursors and solvents are combined in a Schlenk flask, followed by a heat-up reaction at a reasonable temperature. Powder X-ray diffraction (PXRD) and transmission electron microscopy (TEM), confirm the formation of cubic-structured La_2S_3 and $(La_{1-x}Y_x)_2S_3$ nanocrystals align with PXRD reference patterns, verifying the success of the synthesis. Additionally, alloying yttrium with La_2S_3 has been achieved at a maximum concentration of 26%.

Future research will focus on extending this novel synthesis method for lanthanide-doped La_2S_3 materials, aiming to enhance their optoelectronic properties and to analyze the potential of synthesized $(La_{1-x}Y_x)_2S_3$ as a photovoltaic material.

Presenter: Carlee Secrist

Presentation Session: MP2

Level of Study: PhD

Department: Chemistry

Category: Agriculture and Life Sciences

Advisor: Dr. Virginia Montiel-Palma, Associate Professor, Chemistry

Title: Exploring the Catalytic Capabilities of a NU-1000 Catalyst with Ni Organometallic Linkers

Abstract: Hydroboration is a reaction that serves to access important intermediates for the formation of carbon-carbon and carbon-heteroatom bonds. Recently, a Ni complex derived from a diisopropyl silyl phosphine was synthesized and proved to be active for the hydroboration of aldehydes and ketones. The grafting of the Ni complex onto a metal organic framework (MOF) leads to a new material characterized by the usual techniques including PXRD, ICP-MS, and SEM-EDX. MOFs have a crystalline structure, low density, and thermal stability, allowing them to have extraordinary heterogeneous catalytic abilities. NU-1000, a zirconium-based MOF, is used. The synthesized catalyst, [Ni]@NU-1000, allows the hydroboration reaction to take place in one step, and can be easily removed and reused after the reaction occurs.

Presenter: Ana-Maria Valencia

Presentation Session: MP2

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. C. N. Scott, Professor, Chemistry Department

Title: Development of Degradable Polystyrene Derivatives for Sustainable Polymer Applications

Abstract: The extensive use of polystyrene in consumer products has created significant environmental challenges due to its indefinite persistence. Its global accumulation represents one of the most pressing environmental crises of our time, with millions of tons annually fragmenting into microplastics that contaminate marine ecosystems, infiltrate food chains, and persist in the environment for centuries. This research addresses the issue of plastic pollution through the design and synthesis of polystyrene derivatives incorporating enzymatically cleavable linkages.

We developed a copolymer of styrene and vinyl acetate, incorporating hydrolyzable linkages to enable controlled degradation under specific environmental conditions. The resulting product was a low molecular weight polymer (Mn 14000 g/mol) with 3% of the acyl groups. The polymer obtained makes an expanded foam structure and has a slightly higher Tg than conventional polystyrene.

Degradation studies conducted under basic conditions provided evidence of the polymer's degradability. 1H-NMR analysis demonstrated a significant decrease in the peak intensity of the acetyl group, indicating a successful cleavage of the acyl linkage. The results demonstrate a promising approach toward developing more sustainable alternatives to traditional polystyrene while preserving its valuable material properties.

Presenter: Mayra Vazquez

Presentation Session: MP2

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Virginia Montiel-Palma, Chemistry

Title: Hydrogenation/N-Silylation of indoles catalyzed by a bimetallic Pt-Ga complex

Abstract: Prior to the CN bond scission during the HDN (Hydrodenitrogenation) process, the hydrogenation of at least the N containing ring is essential. Here, a new approach to the hydrogenation/N-silylation of indole is reported using a Pt-Ga bimetallic complex. In this work, phenylsilane is used as a hydrogen source to afford mild reaction conditions. The synthesis of the Pt-Ga complex is achieved using a triphosphine ligand. Using 2 mol% of the catalyst gave more than 80% conversion of the indoline. Crystals suitable for X-ray diffraction from the complex were obtained, showing the Pt-Ga interaction. DFT calculations, in agreement with the crystal X-ray diffraction data, demonstrate that the Ga binds to the Pt as a Z-type ligand. Hydrogenation of different indoles and other N-heterocycles, besides the mechanistic studies, are in active development.

Presenter: Durga Purushotham Mahesh Chinthalapudi

Presentation Session: MP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Ganapathi Shanmugam

Title: The Role of Nitrogen and Sulfur Fertilization in Shaping Soybean Root Associated Microbial Diversity and Enzyme Activity in Soybean

Abstract: Fertile soils typically sustain a diverse assemblage of microorganisms, including bacteria, fungi, archaea, and other microbial taxa. Soil microorganisms including bacteria, archaea and fungi play a diverse and often decisive role towards the functioning of ecosystem such as driving the cycling of major elements (e.g., N, C, and S). Understanding microbial dynamics, metabolic and functional activity in both fertile and infertile soybean rhizosphere soils allows for targeted soil management practices. This study aimed to evaluate how different rates of N and S application affect microbial metabolic diversity and enzyme activity in the soybean rhizosphere. We used Biolog Ecoplates to assess microbial metabolic activity, measuring Average Well Color Development (AWCD) as an indicator of overall metabolic function. Treatments included a range of N and S doses, and enzyme assays were conducted to assess the activities of β-glucosidase (BG), N-acetyl-β-D-glucosaminidase (NAG), and arylsulfatase (ARS), enzymes linked to carbon, nitrogen, and sulfur cycling. Principal component analysis (PCA) of carbon source utilization showed distinct microbial metabolic shifts under N treatment (PERMANOVA, $p = 0.001$), with S showing no significant effect on AWCD ($p = 0.321$). Results indicated that high N fertilization (200 lb./ac) significantly increased AWCD (1.83 ± 0.17) and Shannon Diversity Index (SDI: 3.69 ± 0.14) compared to controls (AWCD: 1.47 ± 0.21). Enzyme activity for BG and NAG, linked to carbon and nitrogen metabolism, also peaked at 200 lb./ac N (BG: 2.25 ± 0.24; NAG: 1.69 ± 0.14). In contrast, ARS activity, related to sulfur cycling, responded to S fertilization alone. These findings underscore that N fertilization can significantly enhance rhizosphere microbial diversity and metabolic activity, especially in terms of carbon and nitrogen cycling, while S specifically boosts sulfur cycling enzymes. This research suggests that optimized N application could promote beneficial microbial functions, supporting sustainable soybean production.

Presenter: Alyssa Lea Miller

Presentation Session: MP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Te-Ming Tseng, Associate Professor, Plant and Soil Sciences

Title: Field Assessment of Herbicide Tolerance in the Beauregard Sweetpotato (Ipomoea batatas) to Various Herbicide Chemistries

Abstract: The limited availability of herbicides registered for use in sweetpotato (Ipomoea batatas) production in the United States highlights the need to expand the registration of additional herbicides with diverse modes of action (MOA). This expansion could enhance weed management, increase yields, and support a more sustainable sweetpotato (SP) production system. This field study aims to assess the efficacy and crop tolerance of selected herbicides applied to the Beauregard SP variety in a field environment. The experiment was conducted using a randomized complete block design with four replications per treatment, including a weed- free control. Herbicide treatments included both pre-emergence (PRE) and post-emergence (POST) applications, applied using a International 140 tractor sprayer calibrated to deliver 20 gallons per acre (GPA) with XR8002 flat fan nozzles. The evaluated herbicides included PRE and POST applications of fluridone, glyphosate, glufosinate, carfentrazone, saflufenacil, and acifluorfen, among others. Crop injury was visually assessed by recording injury percentages at 7, 14, 21, and 28 days after treatment (DAT). At the end of the growing season, harvestable yields were evaluated, with yield grades categorized as US No. 1, Canner, Cull, and Jumbo. Total marketable yield was calculated as the sum of each graded category. Overall, metribuzin and linuron applied POST transplant resulted in minimal crop injury while producing high yields. This research provides valuable insights into the field application of herbicides, contributing to the development of improved weed control strategies for sweetpotato production systems.

Presenter: Lahari Nekkalapudi

Presentation Session: MP3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Shankar Ganapati Shanmugham

Title: Exploring Soil Microbial Responses to Cover Crops and Nitrogen in Sweet Potato Production Systems

Abstract: Mississippi, the third-largest, sweet potato producer in the United States, requires adequate nitrogen (N) to improve yields and maintain sustainable environment. Microorganisms, including bacteria and fungi, play a crucial role in regulating N availability from soil, organic matter, and crop residues. However, limited research exists on soil microorganisms' role in improving soil health with cover crops in sweet potato production. Therefore, a field study was conducted at Pontotoc Ridge-Flatwoods Branch Experiment Station in Pontotoc, Mississippi to assess the effects of cover crops on N availability in sweet potato. This study was conducted using a randomized block design with a split-block arrangement, replicated four times, and included three N treatments (0, 50, and 100 lb-1) and three cover crop treatments (no cover crop, winter wheat, and clover). Cover crops planted in fall and terminated in spring before planting sweet potato. Soil samples were collected at planting and after harvesting of sweet potato and termination of cover crops and analyzed for both physical and chemical properties. Amplicon targeting the bacteria (16s) and fungal (ITS) were sequenced for soil microbiome characterization. DNA sequence data was analyzed using QIIME (Quantitative insights into microbial ecology). R statistical software was used for analyzing the data. Cover crop treatments showed significant difference in measured soil permanganate-oxidizable carbon (PoXC). Specifically, clover cover crop treatment showed significantly higher soil PoXC levels than the control (fallow) treatment. Sequencing data revealed significant differences in microbial diversity among N treatments, with notable effects on Shannon diversity ($p = 0.0326$) and Chao1 richness ($p = 0.0080$) at the preplant stage. ITS data also showed significant N-related differences in Shannon diversity ($p = 0.0224$). Cover crop treatments significantly influenced microbial diversity, with changes in Shannon diversity ($p = 0.0035$) and Chao1 richness ($p = 0.0197$) at the preplant stage, and further significant impacts on Chao1 richness at post-termination ($p = 0.0033$) and harvest ($p = 0.0006$). Beta diversity analysis revealed significant effects of nitrogen and cover crop treatments. Pre-planting 2023 nitrogen treatments showed a significant difference ($p = 0.001$). Cover crop treatments significantly impacted beta diversity at preplant ($p = 0.002$), ITS preplant ($p = 0.001$), post-termination ($p = 0.013$), and harvest ($p = 0.001$). In conclusion, both nitrogen and cover crop treatments significantly influenced soil microbial diversity and soil health, with cover crops, particularly clover, enhancing soil permanganate-oxidizable carbon levels and driving notable shifts in microbial community structure across different growth stages of sweet potato production.

Presenter: Chami Rampati Dewage

Presentation Session: MP3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr.Raju Bheemanahalli Rangappa, Assistant Research Professor, Plant and Soil sciences

Title: Effects of Low Nitrogen and Drought Stress on Finger Millet Yield Components

Abstract: Effects of low nitrogen and drought stress on finger millet yield components

Chami Rampati Dewage, Mohan K Bista, Alekhya Chakravaram, Nisarga K Narayan and Raju Bheemanahalli

Finger millet (Eleusine coracana L.) is a low-input crop having potential to thrive under a variety of harsh environmental conditions. Because of its nutraceutical and stress-resilient traits and low input requirement, this crop has been recently promoted as an alternative to traditional cereals under changing climate. However, systematic studies quantifying the response of finger millet to individual and combined abiotic stress have been limited. In this study, high-yielding genotype was exposed to four growing environments: (i) control (CNT) (ii) drought stress (DS) (iii) low nitrogen (LN), and (iv) drought stress + low nitrogen (DLN) during the flowering stage. Results revealed that LN had no effect on any parameters except grain yield. However, drought stress alone or combined with low nitrogen significantly affected ($p < 0.05$) most of the parameters including plant height, days to maturity and grain yield. The individual effects of drought stress or low nitrogen did not reduce the shoot dry mass. However, their combined effect significantly reduced (23%) it compared with control. The grain yield was significantly reduced by DLN (55%), followed by DS (30%), and LN (24%), compared with CNT. However, coming to harvest index, only DLN induced the significant reduction (25%) compared with CNT. The 1000-seed weight was reduced by 11% in DS, while increased by 10% and 4% in DLN and LN, respectively. These results suggest that though finger millet has several climate resilient traits, combined effects of abiotic stresses might significantly limit the genetic potential of finger millet below economic threshold level.

Presenter: Jasmine Sahota

Presentation Session: MP3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Ganapathi Shanmugam, Assistant Research Professor, Plant and Soil Sciences

Title: Utilizing Insect Frass: A Sustainable Approach to Organic Fertilization in Agriculture

Abstract: The growing use of insects for food and feed produces a high number of byproducts, known as insect frass. Insect frass is a mixture of insect excreta, shed exoskeletons, and undigested feed. Insect frass is gaining attention as a potential organic amendment due to its rich macronutrient (N, P, K), micronutrient, and microbial consortia. However, only a few studies have thoroughly examined the effect of soil amendment with insect frass on rhizosphere microbial communities and plant growth. The objective of this study is to investigate how diet source, origin (insect species), type (frass) combination affects frass-associated microbe and how it affects plant growth when applied as a soil amendment. A greenhouse trial, using a completely randomized design evaluated soil amendments with frass originating from two insect species (Acheta domesticus and Hermetia illucens) at five different rates (0, 50, 100, 250 lb/ac) compared to mineral fertilizer using corn as modal plant. We employed 16S rRNA (bacterial) and ITS (fungal) amplicon sequencing to characterize the frass associated microbial community composition. Additionally, we used Biolog EcoPlates to measure microbial metabolic activity by assessing average well color development (AWCD). Results showed significant differences in microbial diversity and community structure based on origin and diet sources. Frass amendment rates significantly influenced aboveground biomass ($p < 0.05$), with higher rates correlating with increased biomass. AWCD analysis indicated that frass amendments altered microbial metabolic activity. Principal Component Analysis (PCA) revealed distinct microbial community clustering based on frass origin, highlighting its role in shaping soil microbial composition. These findings demonstrate that insect species and diet sources influence frass quality, which in turn affects the aboveground-belowground feedback loop. Understanding these dynamics is crucial for optimizing insect frass as a biofertilizer.

Presenter: Amber Crenshaw

Presentation Session: MP4

Level of Study: PhD

Department: Counseling, Higher Education Leadership, Educational Psychology, and Foundations

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Elaine Wei, Educational Psychology

Title: School Bullying Uncovered: Insights from Middle Schoolers

Abstract: This study aimed to fill a gap in qualitative research by exploring how adolescents conceptualize bullying, perceive its consequences, and experience it within educational environments. While bullying has been studied in various contexts, it has not been extensively explored from a qualitative perspective, especially in terms of how adolescents conceptualize bullying within schools. Five participants, aged 12 to 14, participated in in-depth interviews to investigate their experiences and perceptions of bullying. The analysis identified several key themes, including the contextual nature of bullying, where participants indicated that bullying behaviors were often dependent on the relationship between individuals (e.g., friends versus strangers). Additionally, participants reported significant emotional consequences of bullying, such as sadness, fear, and anxiety, which were compounded by a lack of social connection and a perceived lack of support from adults. Educational consequences were also evident, with bullying disrupting learning and diminishing feelings of safety and belonging in the school environment. Furthermore, participants highlighted the ineffectiveness of interventions like detention and alternative schools, suggesting the need for more personalized and empathetic approaches. These findings highlight the complexity between bullying behaviors and adolescents understanding of the phenomenon, as well as the impact of bullying behaviors on adolescents educational experiences.

Presenter: Clifford Boateng

Presentation Session: MP4

Level of Study: Master's

Department: Geoscience

Category: Education, Arts and Sciences, and Business

Advisor: Prof. Shrinidhi Ambinakudige, Department of Geoscience

Title: Assessing the Socioeconomic and Environmental Determinants of Asthma Prevalence in the Mississippi Delta: A Spatial and Statistical Analysis

Abstract: The association between the prevalence of asthma, socioeconomic and environmental determinants has been the focus of numerous studies. However, research on the direction of these associations and at-risk populations remains limited. This study examines the relationship between asthma prevalence and multiple socio-physical factors in the Mississippi Delta using 2022 census tract-level data from the CDC. Asthma crude prevalence among adults (≥18 years) was analyzed through three OLS regression models: (1) asthma prevalence and satellite-derived Aerosol Optical Depth (AOD) from MODIS, (2) asthma prevalence and racial demographics, (3) a combined model incorporating AOD, race, socioeconomic factors (e.g., median income, education, household fuel), occupation (pollution exposure-based), environmental variables (building construction year, % agricultural land), and lifestyle factors (smoking). Additionally, the combined variables were analyzed with GWR to assess local spatial variations. Results indicate higher income levels were associated with lower asthma prevalence, while smoking was significantly linked to increased asthma rates. A 1% increase in the Non-Hispanic Black population was consistently associated with higher asthma prevalence compared to non-Hispanic Whites. Although positive associations were observed between AOD, utility gas usage, and asthma prevalence, these relationships did not reach statistical significance ($p > 0.05$). Similarly, the associations between asthma prevalence and other racial groups were not statistically significant ($p > 0.05$). The GWR model provided slightly different results. These findings highlight the critical role of socio-physical factors in explaining asthma prevalence in the Delta region and can inform asthma prevention strategies and public health interventions in areas facing similar socio-environmental challenges.

Presenter: Maria Haider

Presentation Session: MP4

Level of Study: PhD

Department: Kinesiology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Stamatis Agiovalsitis Kinesiology Department

Title: Feasibility and Effectiveness of a Dance Program for People with Down Syndrome Using Self-Determination Theory

Abstract: Facilitators of physical activity (PA) in individuals with Down syndrome (DS) align with autonomy, competence, and relatedness that, according to Self Determination Theory (SDT), promote motivated behavior. The purpose of the study was to assess the feasibility of a dance program based on SDT in adults with DS. Eight adults with DS (2 men and 6 women; age 31±12 years) participated in an 8-week dance program that systematically promoted relatedness, competence, and autonomy. Hip hop and jazz styles were used for 4 weeks each. We derived feasibility data: resources, attendance, cost, and time requirements. Before and after the program, we measured physical performance with the 6 Minute Walk Test (6MWT) and the Short Physical Performance Battery (SPPB), autonomy, competence, relatedness, autonomy support, autonomous motivation, friend and staff support. We evaluated changes with Wilcoxon signed-rank tests and effect sizes (ES). Mean attendance was 68.8±21.9%. Total cost was $2,877. Total time spent was 71 hours. External regulation significantly decreased and had a large ES ($p = .035$; ES: -0.53). Non-significant differences, but with medium ES were observed in total SPPB, balance, chair-stand, autonomy, autonomous motivation, autonomy support, and staff support scores ($p > 0.05$; ES: -0.34 to -0.46). Non-significant changes with small ES were found for gait speed, 6MWT, competence, and friend support scores ($p > 0.05$; ES: -0.20 to -0.28). A dance program based on SDT is feasible and can yield positive psychological and physical outcomes in adults with DS.

Keywords: Intellectual disability; Trisomy 21; Dance; Motivation

Presenter: Tanmoy Malaker

Presentation Session: MP4

Level of Study: PhD

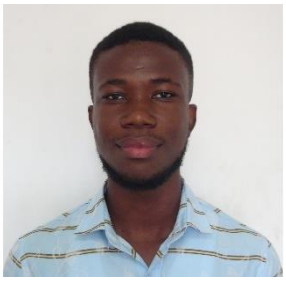
Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Qingmin Meng

Title: Spatiotemporal analysis of urban water hardship using historical boil water notices

Abstract: This study employs a combination of GIS, OpenStreetMap, open-source geospatial data, and GeoAI models to perform a comprehensive spatial analysis of boil water notices (BWNs) in Jackson, Mississippi from 2016 to 2023. The study aims to explore the spatial and temporal distributions of BWNs as an indicator of urban disparity from the perspective of service facilities and urban health. The study tries to unveil the intersections between water quality issues and urban socioeconomic disparities. The research maps the distribution of BWNs through automated feature extraction from text data. This multi-criteria approach combines spatial analysis and demographic information to highlight areas of lower income and high minority aggregation. Initial findings reveal that these underserved communities not only suffer from more frequent BWNs but also exhibit greater vulnerability due to socioeconomic factors such as lower income, education levels, and high minority populations. The spatial and temporal patterns analysis incorporating GeoAI tools enhances the accuracy of identifying at-risk areas, enabling proactive measures. This study underscores the utility of combining open-source mapping with GeoAI to address critical public health challenges, advocating for data-driven, equitable interventions in water crisis management that prioritize the needs of the most disadvantaged urban populations and areas. Through this nuanced spatiotemporal and analytic approach, the research contributes to the ongoing discourse on urban resilience and social equity, offering actionable insights for policymakers and urban planners for sustainable city planning.



Presenter: Jephthah N. Marfo

Presentation Session: MP4

Level of Study: PhD

Department: Geoscience

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Shrinidhi Ambinakudige

Title: Assessing the Impacts of Flooding on Agricultural Lands and Settlements in the Southern Mississippi Delta Using Remote Sensing and Geospatial Techniques

Abstract: Throughout the Mississippi Delta, flooding has a significant impact on human settlements and agricultural land. This study utilized Sentinel-2A satellite data to assess the impacts of the Great Mississippi River flooding of 2019 in the southern Mississippi Delta between December 2018 and August 2019. The study combined change detection techniques from land use and land cover change (LULCC) analysis to identify and quantify the areas affected by flooding, particularly on agricultural land and human settlements. Building footprint data was retrieved from the Mississippi Automated Resource Information System (MARIS), which provided precise locations and sizes of structures in the affected area. Additionally, agricultural data used in this study was sourced from the Cropland Data Layer (CDL) via Google Earth Engine. The study showed that crops such as corn, cotton, wheat, rice, and soybeans experienced different degrees of flooding from January to August. The analysis indicates that corn, cotton, and wheat were particularly affected in May and August, whereas soybeans and rice showed more consistent flooding patterns throughout the period. Also, the flooding events caused significant damage to local settlements, with the number of affected buildings peaking in August, showing the severity of the situation. This study provides insights into seasonal flooding patterns in the Mississippi Delta and their substantial impact on agriculture and infrastructure. The findings serve as a foundation for future research on flood mitigation strategies, enhancing agricultural resilience, and protecting vulnerable areas.

Presenter: Shamaria M. Mosley

Presentation Session: MP4

Level of Study: Master's

Department: Teacher Education and Leadership

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Patricia Hampshire

Title: Engaging Families with Children with Disabilities in Mississippi's Early Learning Centers and Daycares

Abstract: Family engagement is a crucial component of early childhood education (ECE), particularly for children with disabilities. This study explores how early learning centers and daycare facilities in Mississippi engage families of children with disabilities, examining both the strategies implemented and the challenges faced. The data was collected from both parents and administrators to assess the effectiveness of engagement practices and identify gaps in service delivery. Findings highlight the role of inclusive policies, staff training, and communication practices in fostering meaningful collaboration between families and educators. However, systemic barriers such as resource limitations, inadequate teacher preparation, and policy constraints hinder effective engagement. This research shows the need for evidence-based strategies and policy reforms to enhance family involvement and ensure equitable access to high-quality early learning experiences for children with disabilities. The implications of this study extend to policymakers, educators, and researchers working to improve inclusive early education practices in underserved communities.

Presenter: Nishat Shermin

Presentation Session: MP4

Level of Study: Master's

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope, Professor, Associate Vice President for Research, Mississippi State University

Title: A Comparative Machine Learning Approach Integrating UAS and Multispectral Imagery for Classifying Fractional Vegetation Cover in Rangelands

Abstract: Fractional vegetation cover (FVC) models are essential for managing rangelands and agricultural landscapes. While remote sensing technologies have improved vegetation monitoring, integrating high-resolution local data with broader-scale satellite imagery remains challenging. This study addresses these challenges by combining UAS imagery with multisource satellite data using machine learning to enhance vegetation classification accuracy. Martin Ranch in Menard County, Texas, was selected as the study area, where a WingtraOne GEN 2 drone equipped with a Micasense RedEdge-P multispectral camera captured high-resolution imagery and DJI Zenmuse L-1 to collect LiDAR data. These data were integrated with Google Earth Engine (GEE)-derived Sentinel-1 Synthetic Aperture Radar (SAR) and Sentinel-2 indices, including Radar Vegetation Index (RVI), Normalized Difference Vegetation Index (NDVI), Enhanced Vegetation Index (EVI), and Normalized Difference Water Index (NDWI), alongside LiDAR-derived canopy height. A Random Forest (RF) and a Gradient Boosting (GBoost) model classified vegetation into grasslands, shrubs/scrubs, woody plants, and non-vegetated areas. The results highlight the superior performance of the GBoost model across all categories. For grasslands, shrubs/scrubs, woody plants, and non-vegetated areas, the GBoost model achieved F1-scores of 0.46, 0.37, 0.65, and 0.43, respectively, outperforming the RF model, which achieved F1-scores of 0.36, 0.31, 0.55, and 0.41. Similarly, GBoost demonstrated higher accuracy across these categories, with values of 73%, 69%, 82%, and 71% compared to RF's 66%, 66%, 77%, and 72%. These findings underscore GBoost's robustness in handling complex spectral and spatial relationships, particularly in heterogeneous rangeland environments. This study produced a high-resolution FVC map, offering valuable insights into vegetation dynamics and management. The map can also support biomass prediction to assess food and nutrition availability for livestock in rangeland areas. By integrating UAS imagery, LiDAR data, and advanced machine learning techniques, this study highlights a pathway to improve sustainable rangeland management practices.

Presenter: Lydia Bailey

Presentation Session: MP4

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Molly Zuckerman, Full Professor, Anthropology and Middle Eastern Cultures

Title: Comparative analysis of periodontal disease between individuals with early and late stage acquired syphilis

Abstract: Research on the pathogenesis and pathophysiology of acquired syphilis requires a more robust understanding of the human host characteristics associated with persistent, late-stage infection, for both past and living populations. Here, we address co-infection with syphilis and periodontal disease (PD): Is PD (presence/ absence, severity) associated with early stage (primary, secondary) vs. late (latent, tertiary) syphilis, independent of age-at-death? Though representative of local inflammation, PD is associated with systemic inflammatory processes and may indicate a hyper-inflammatory response or phenotype (HIP); individuals with a HIP may be vulnerable to persistent syphilis, potentially enabling continued transmission and late-stage morbidity and mortality. We assess this association amongst early 20th century, pre-antibiotic-era individuals (N=136) with clinical, antemortem syphilis diagnoses in the Hamann-Todd Osteological (late: n=91; early: n=9), Robert J. Terry Anatomical (late: n=24; early: n=9), and George S. Huntington Anatomical Collections (late: n=3; early: n=0). PD is assessed following Kerr (1988), which aligns clinical PD staging with alveolar resorption evident in dry bone. Results from Fisher's exact test (p=0.765) suggest that PD presence does not differ relative to syphilis stage (late: 79.6%; early: 77.8%), possibly because of the small number of people in the early-stage group; future work will focus on increasing the early-stage group size and incorporating PD severity. The crude prevalence of PD across the total group (79.4%) may indicate a widespread HIP across all stages of syphilis, so future work including a control group will further assess these relationships.

Presenter: Emma Berry and Molly Campbell

Presentation Session: MP5

Level of Study: Master's

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Carley Calico Morrison, Associate Professor, School of Human Sciences

Title: When the Teacher Becomes the Student: A Reflection-Based Analysis of a Teaching Academy for University Faculty

Abstract: The College of Agriculture and Life Sciences (CALS) Teaching Academy at Mississippi State University aims to advance teaching and learning excellence by equipping educators with practical tools and strategies to enhance classroom engagement, improve student outcomes, and promote a sense of community. Through eight interactive sessions, participants reflect on their current teaching methods, implement changes, and monitor student feedback. Session topics included lesson planning techniques, strategies for building connections with students, integration of Artificial Intelligence tools, and the Scholarship of Teaching and Learning (SoTL). Participants worked with members of their cohort to develop and implement research projects to submit to the North American Colleges and Teachers of Agriculture Conference. Eleven faculty members from nine CALS units completed the program and indicated having little to no formal training on the principles of teaching and learning prior to applying for the Academy. From written reflections by the participants after each session, we determined that participants found the program to be both supportive in their efforts and informative in new practices. Key takeaways of the reflections include increased utilization of organizational tools, application of active learning techniques, and student collaboration, feedback, and motivation. In terms of personal development, participants largely conveyed feeling supported by their peers, motivated to continue professional development, and empowered to incorporate new teaching strategies. Suggestions for future iterations of the program included clarifying a timeline of expectations, increasing peer interaction, adjusting the schedule to increase participation, and creating a space for continued support beyond the conclusion of the program.

Presenter: RICHARD BOATENG

Presentation Session: MP5

Level of Study: Master's

Department: Biological Sciences

Category: Education, Arts and Sciences, and Business

Advisor: DR. GORDON, DONNA M., PROFESSOR, BIOLOGICAL SCIENCES

Title: Development of hybrid actin constructs to identify a role for the actin amino terminus in occidiofungin susceptibility

Abstract: Occidiofungin is a broad-spectrum antifungal with a mechanism of action unlike currently approved antifungal agents, as it targets the cytoskeletal filament, actin. Actin is key for cell viability as it supports many fundamental cellular processes. Given the high degree of amino acid sequence conservation across eukaryotic actin proteins, it is unclear what mediates occidiofungin specificity. Even within fungi, there are differences in occidiofungin susceptibility with Candida albicans exhibiting a 2-fold resistance profile compared to Saccharomyces cerevisiae. To identify the molecular drivers of this difference, C. albicans-S. cerevisiae hybrid actin constructs were generated that differed at their amino terminus. Swapping the first 9 amino acids of Candida albicans actin with the first 8 amino acids of Saccharomyces cerevisiae, resulted in a functional actin protein that lost its resistance profile. We are currently testing the reverse construct in which the first 8 amino acids of S. cerevisiae actin are replaced with the first 9 amino acids of C. albicans. Analysis of growth kinetics and 48hr susceptibility assays have found no difference in cell doubling time, overall growth and occidiofungin sensitivity profile compared to strains expressing the wildtype S. cerevisiae or C. albicans ACT1 genes. Additional studies to be carried out include immunoblot analysis to measure actin protein level and microscopy to analyze cellular actin organization and nuclear positioning defects. Results from this study will provide insight into properties of actin that influence occidiofungin bioactivity which can be leveraged to improve antifungal specificity and efficacy.

Presenter: Molly Campbell and Emma Berry

Presentation Session: MP5

Level of Study: Master's

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Carley Calico Morrison, Associate Professor, Agriculture Education, Leadership and Communication

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Presenter: Kasey Elder

Presentation Session: MP5

Level of Study: PhD

Department: Animal and Dairy Science

Category: Agriculture and Life Sciences

Advisor: Dr. Caleb Lemley, Professor, Animal and Dairy Sciences

Title: Effects of Late Gestational Melatonin Supplementation on Behavior and Growth Characteristics in Angus Beef Cows and Calves

Abstract: Late gestation is marked by rapid fetal growth, increasing metabolic demand, and oxidative stress in dams, which may negatively impact both maternal and offspring health. Melatonin, a potent antioxidant and neuromodulator, may mitigate oxidative stress and influence behavioral responses. This study evaluated the effects of late-gestation melatonin supplementation in Angus beef cows on dam behavior and offspring growth. Pregnant Angus cows (n=24) were randomly assigned to a control (CON) or melatonin (MEL) group. MEL cows received melatonin (200 µg/kg body weight) dissolved in ethanol and applied to supplemental feed, while CON cows received ethanol alone. Supplementation began at approximately day 209 of gestation and continued for 54 days. Behavioral assessments, including chute score, exit velocity, maternal aggression (MA), and mothering aptitude (MOM), along with calf morphometrics (body weight, girths, hip height, curved-crown rump length [CCR], ponderal index), were recorded at key intervals. No significant differences ($P>0.05$) were found between treatments for chute score, exit velocity, MA, or MOM. Exit velocity varied over time ($P<0.0001$) but was not influenced by treatment. Calf body weight showed a tendency for treatment effects ($P=0.08$), but other morphometric measures showed no differences. Time significantly influenced hip height, CCR, and ponderal index ($P<0.05$), regardless of treatment. These results indicate that melatonin supplementation at the given dose and timing did not alter dam behavior. However, further research is needed to evaluate its effects on neurotransmitter production and metabolism in dams and calves and its potential long-term impacts on calf performance.

Presenter: Jackson Horton

Presentation Session: MP5

Level of Study: Master's

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. McCubbins, School of Human Sciences

Title: Transforming Teaching: Enhancing Faculty Teaching and Student Learning

Abstract: Equipping faculty members with innovative and engaging teaching strategies enhances student success and fosters a positive postsecondary educational experience. Traditionally, land-grant universities have an inherit focus on research, teaching, and service. While research-based faculty may excel in research areas, they often lack the pedagogical skills to teach today's diverse and technologically advanced students. The College of Agriculture and Life Sciences Teaching Academy (CTA) at Mississippi State University offers a year-long program designed to enhance faculty teaching and student learning. The CTA includes four workshops that overview effective teaching, strategies for designing meaningful activities, assessments, and reflections, approaches to building rapport, and guidelines for documenting teaching success. Following the four sessions, participants engage in a mentorship program and community of practice to conduct Scholarship of Teaching and Learning (SoTL) research. A Swivl is used to record a class session of participants at the beginning and end of the CTA. Program facilitators provide constructive feedback on both recordings and document changes in teaching strategies between the two recordings. Eleven faculty from nine disciplines participated in the 2024 CTA. Due to varying teaching schedules, 7 participants provided recordings at the program's end. Before the CTA, participants primarily used lecture-based teaching with limited student engagement and minimal routines to assess learning. Some encouraged student participation, but many lacked consistent procedures for preparing students for the next session. Post-CTA, participants improved engagement, established opening routines where previous knowledge was linked to new instruction, and frequently checked for understanding. They incorporated real-world applications, moved dynamically throughout the classroom, and adapted teaching to foster engagement. Areas for improvement include incorporating more emphasis on activity-based instruction, increased wait time when asking questions, and implementing multimodal instructional strategies. The CTA effectively enhanced teaching practices of the program completers.

Presenter: Megan Mills

Presentation Session: MP5

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. C. O. Lemley, Professor, Animal and Dairy Sciences

Title: Impact of oral melatonin supplementation on sperm quality and testicular artery hemodynamics in the bull

Abstract: The objective of this study was to examine the impact of oral melatonin supplementation on sperm quality and testicular artery hemodynamics in the bull. Yearling Angus bulls (n = 21) were randomly allocated into two groups, melatonin fed (MEL; n = 11) or control fed (CON; n = 10) from October 2024 to January 2025 (90 d total). Body weight was collected, and melatonin supplementation was adjusted weekly. Scrotal circumference and semen samples were collected on d 0, 28, 56, and 84. Semen samples were obtained via electroejaculation and sperm morphology and motility were evaluated by CASA. Testicular artery hemodynamic measurements were collected on d 0, 14, 28, 42, 56, 70, and 80 via Doppler ultrasonography. Data were analyzed using the MIXED procedure of SAS specific for repeated measures. Melatonin supplementation increased sperm motility on d 30 ($P = 0.0390$) and d 60 ($P = 0.0890$) in MEL (84.7 + 3.7, 86.1 + 4.3) compared with CON bulls (73.4 + 3.7, 76.6 + 3.6). Velocity measurements were lower ($P < 0.05$) in MEL compared with CON bulls on d 0 however, melatonin supplementation improved sperm velocities resulting in no differences ($P > 0.1$) between MEL and CON bulls on d 30 and d 60. Melatonin supplementation from fall to winter resulted in a notable increase in sperm motility despite the lack of alterations to testicular artery hemodynamics due to treatment.

Presenter: Sharon Damilola Samuel

Presentation Session: MP5

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Rahel Mathews, Assistant Professor, Biochemistry, Nutrition and Health Promotion

Title: Association between household food security, maternal dietary quality and breastfeeding duration: An analysis of NHANES 2015-2018

Abstract: This study explored the association between household food security, maternal dietary quality and breastfeeding duration using NHANES 2017-2018 data. The dependent variable was breastfeeding duration defined by less than 6 months or 6-24 months. The independent variables were food security as defined by USDA and dietary quality was measured using the Healthy Eating Index (HEI 2015). The multivariable logistic regression models were adjusted for mother's age, toddler's gender, race, educational level, income, and WIC participation. The sample comprised 442 mother-child dyads of children aged 0–24 months. The mean maternal age was 28 years. The majority of children, (58.8%) were male, and the overall mean age was 14 months. Most mothers were non-Hispanic White (53.6%), Hispanic (24.9%), or non-Hispanic Black (11.2%). About 69.2% breastfed for less than 6 months. Household full food security was reported by 63.2% of mothers. Overall, the sample had a mean HEI score of 48 (out of 100). Preliminary logistic regression results showed that food security was not significantly associated with breastfeeding duration. In contrast, dietary quality was significantly associated with breastfeeding duration. Mothers in Q1 (lowest dietary quality) were 5.35 times more likely to stop breastfeeding before 6 months (AOR=5.35 95% CI: 1.07-26.70). Those in Q2 were 2.15 times more likely (AOR=2.15 95% CI: 2.15-4.98) and Q3 were 1.76 times more likely (AOR=1.76 95% CI: 0.85-3.65) to stop breastfeeding before 6 months compared to those in Q4. Consuming a diverse range of nutrient-dense foods may enhance lactation in mothers, supporting extended breastfeeding practices. Improving household dietary quality, along with targeted nutrition education, may support longer breastfeeding durations in the U.S.

Presenter: Tamara Heck

Presentation Session: MP6

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Luis Avila, Associate professor, Plant and Soil Sciences

Title: Memory Induced by Recurrent Drought Stress in Chirca (Acanthostyles buniifolius)

Abstract: To thrive as a successful weed in natural pastures, a plant must have the competitive ability and resilience to withstand environmental stresses and rapidly reclaim space once those stressors diminish and the other non-stress-tolerant plants die. Acanthostyles buniifolius, known as chirca, is a widely spread weed in South American natural pastures. It is acclaimed for its ability to withstand environmental stresses and flourish in stressful environments. The study evaluated the memory effect of drought stress in chirca plants. The experiment was conducted in a greenhouse, arranged in a randomized block design with three replications. Treatments included: T1 = Control plants, without any period of water deficit; T2 = Primed plants, experienced recurrent water deficit at 141 and 164 DAE; T3 = Naïve plants, experienced a water deficit at 164 DAE. Water restriction was set as 15% of pot capacity, and plants without water restriction were set as pot capacity. The results showed that plants exposed to primed plants showed better maintenance of water status than naïve plants. Chirca plants exposed to primed show better maintenance of water status when compared to naïve plants. Naïve plants exhibited a higher proline concentration, indicating a greater protection against oxidative damage and osmotic regulation. Based on our results, we can conclude that water deficit in the vegetative stage can prepare chirca plants for future drought events. These results show that chirca is a very adaptative weed and may become a bigger problem to pastures in South America if drought becomes more frequent and severe.

Presenter: Pankaj Prashad Joshi

Presentation Session: MP6

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. M. Dhakal, Assistant Research Professor, Mississippi Water Resource Research Institute

Title: Automated Furrow Irrigated Rice Production System Mitigates Greenhouse Gas Emission in Rice

Abstract: Conventional rice production system is predominantly managed by continuous flooding which significantly contributes to greenhouse gas (GHG) emissions. Intermittent irrigation reduces soil water saturation period and creates aerobic conditions that may reduce GHG, especially methane (CH4). However, drying and wetting process may exacerbate N2O emissions, which has greater global warming potential than CH_4. A farmer's field experiment was initiated in April 2024 to evaluate the effects of three water management practices: continuous flooding with multiple inlet irrigation (MIRI), furrow irrigation with recirculating top (FIR top) and recirculating bottom (FIR bottom) on greenhouse gas (CH_4, N_2O, and CO_2) emissions. Treatments were replicated six times. Weekly to biweekly gas data were collected from static chamber and analyzed using gas chromatography with flame ionization and electron capture detection. Yield and yield attributes were collected before harvest. Results revealed that FIR top has 76 percent lower seasonal methane emission than MIRI, however FIR bottom has 84 percent greater methane emission than MIRI. Seasonal emissions for N_2O and CH_4 were comparable across treatments. Additionally, treatments have similar yields. Therefore, rice production with automated furrow irrigation increases the water efficiency with reduced greenhouse gas emissions in southern USA.

Presenter: Oluwadamilare Emmanuel Oloyede

Presentation Session: MP6

Level of Study: PhD

Department: Plant and Soil Sciences

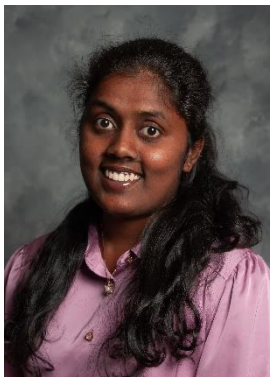
Category: Agriculture and Life Sciences

Advisor: Dr. Madhav Dhakal, Assistant Research Professor, Mississippi Water Resources Research Institute

Title: Developing a model to estimate greenhouse gas fluxes and evapotranspiration using machine learning and remote sensing data

Abstract: Measurement of greenhouse gas (GHG) emissions from irrigated rice production is critical in understanding ecological footprint of rice production. However, direct measurements of gas fluxes can be time-consuming, expensive and labor-intensive. Remote sensing (RS) provides an alternative to the measurement of GHG fluxes. Field trials were initiated in 2024 at farmers field in Mississippi Delta. In this study, satellite data will be used to estimate GHG (CH4, CO2, H2O) fluxes from two irrigation management systems in rice – continuous flooding versus row rice (alternate wetting and drying with automated tailwater recirculation). Treatments will be replicated three times in a randomized complete block design. Satellite data will be used (i) to optimize existing models to predict CH4, CO2, H2O fluxes from the rice canopy; (ii) develop a model to predict these variables by using machine learning models to analyze the remotely sensed data and ground reference data from Eddy Covariance (EC) system. The developed model will be used to map greenhouse gas emission on a regional scale. This study is expected to (i) show reduced methane emission in rice production as influenced by the row rice; and (ii) develop strategies to quantify and monitor ecological footprint of rice production under different irrigation management systems (continuous flooding versus row rice) in the U.S.

Presenter: Apphia Santy



Presentation Session: MP6

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Guihong Bi, Professor, Plant and Soil Sciences

Title: Growing Raspberries in the South: Uncovering Heat-Tolerant Varieties for Mississippi

Abstract: Growing Raspberries in the South: Uncovering Heat-Tolerant Varieties for Mississippi

Apphia Santy*, Guihong Bi, Tongyin Li, Department of plant and soil science, Mississippi state University, Mississippi State, MS 39762(as5152@msstate.edu)

Traditionally, raspberry cultivation has been concentrated in cooler regions such as California, Oregon, and Washington, where mild climates favor production. But can raspberries grow in Mississippi's challenging subtropical climate? This research explores the potential of heat-tolerant raspberry cultivars to adapt to Mississippi's intense summer heat and fluctuating winter temperatures. Locally produced raspberries could meet growing consumer demand, driven by the fruit's well-known health benefits. This study evaluates the performance of various raspberry cultivars to identify those most suited to Mississippi's challenging climate while maintaining high fruit quality. The experiment utilized a randomized complete block design with cultivars grown under conventional and organic fertilizer treatments. Data collection focused on plant growth, fruit yield, key quality parameters such as berry size, sweetness, and acidity, as well as phytochemical attributes including total phenolics, flavonoids, anthocyanins, and antioxidants. Preliminary results revealed significant variation among cultivars. 'Prelude' and 'Himbo-Top' demonstrated the highest yields under both fertilizer treatments, while 'Tayberry' and 'Loganberry' produced the lowest. Cultivars such as 'Caroline,' 'Bristol,' and 'Loganberry' exhibited higher single berry weights, whereas 'Heritage' and 'Fall Gold' had lower weights. 'Bristol,' 'Anne,' and 'Latham' produced fruits with high soluble solid content, while 'Dormanred' and 'BP1' were less sweet. Acidity levels varied, with 'Polka' and 'Crimson Giant' being more tart, and 'Glencoe' and 'Niwot' being less acidic. This ongoing research aims to provide valuable insights into which cultivars are best suited for Mississippi's climate, to empower local growers with sustainable production options.

Presenter: Bala Subramanyam Sivarathri

Presentation Session: MP6

Level of Study: PhD

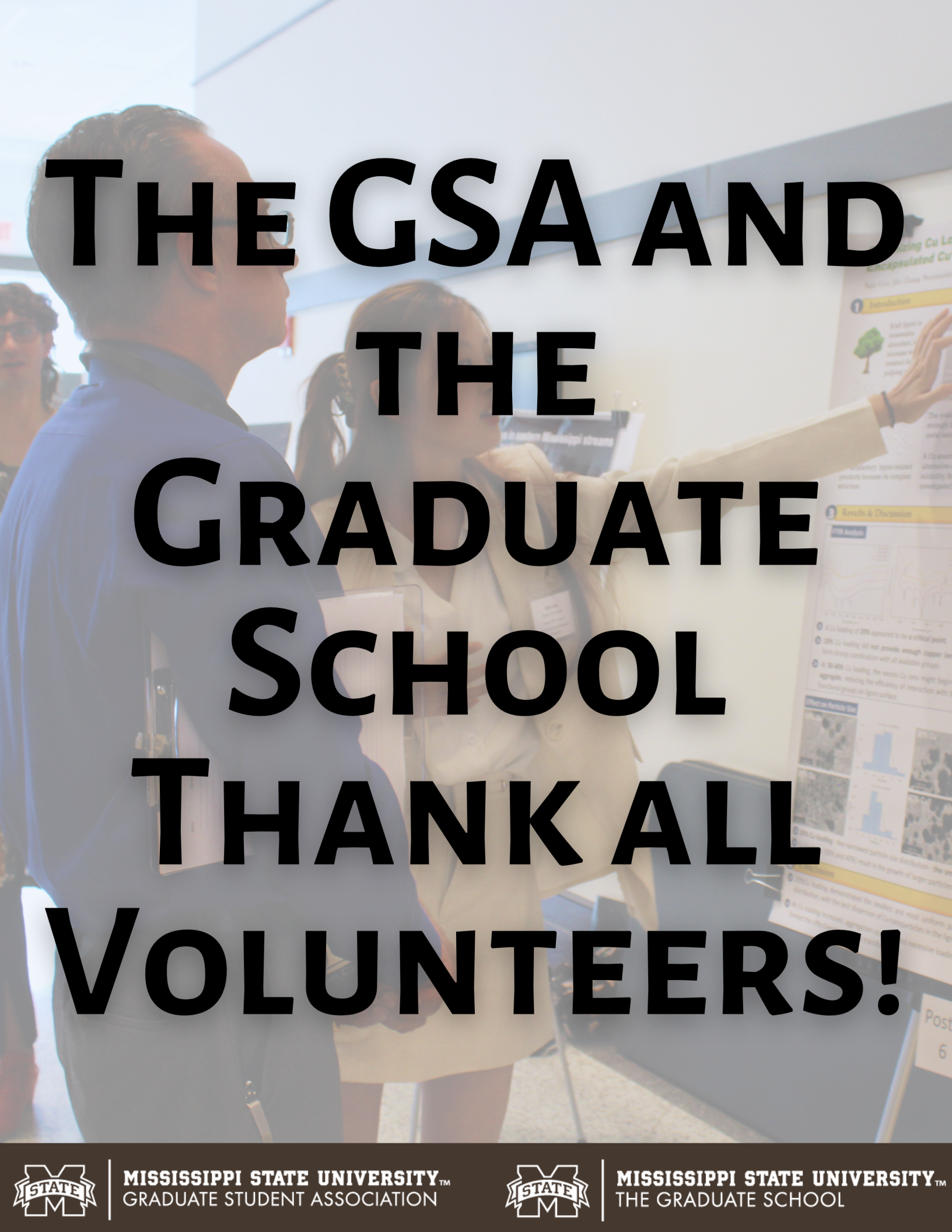
Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli Rangappa

Title: Investigating the Impact of Biostimulants on Physiology and Seed Yield under Heat Stress

Abstract: Biostimulants are considered one of the most promising methods to enhance plant resilience under stress. While earlier studies have emphasized the benefits of biological treatments for horticultural crops, their role in alleviating stress in field crops has been largely overlooked. Heat stress during the reproductive stage negatively impacts soybean production. Thus, the main objective of this study was to assess the impact of biostimulants in mitigating heat stress during the reproductive stages of soybeans. A two-year field study was conducted to test the efficiency of seed, foliar, and in-furrow-applied biostimulants. At R2, heat stress (+3°C above ambient) was introduced by placing polytunnels over the targeted plots. Under heat stress, seed-applied microbial biostimulant BioWake increased chlorophyll content by 11% and stomatal conductance by 23% compared to the control. Heat stress significantly impacted yield traits, leading to an overall 26% reduction in soybean yield. BioWake showed a positive effect on yield by increasing 17% under heat stress compared to control. Heat stress did not have a significant impact on soybean protein and oil content. Overall, the findings of this study confirm that biostimulant applications can enhance soybean resilience to heat stress under field conditions.



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