Fall 2024 Graduate Research Symposium

October 5, 2024

Morning Sessions - 8 AM to 12 NOON

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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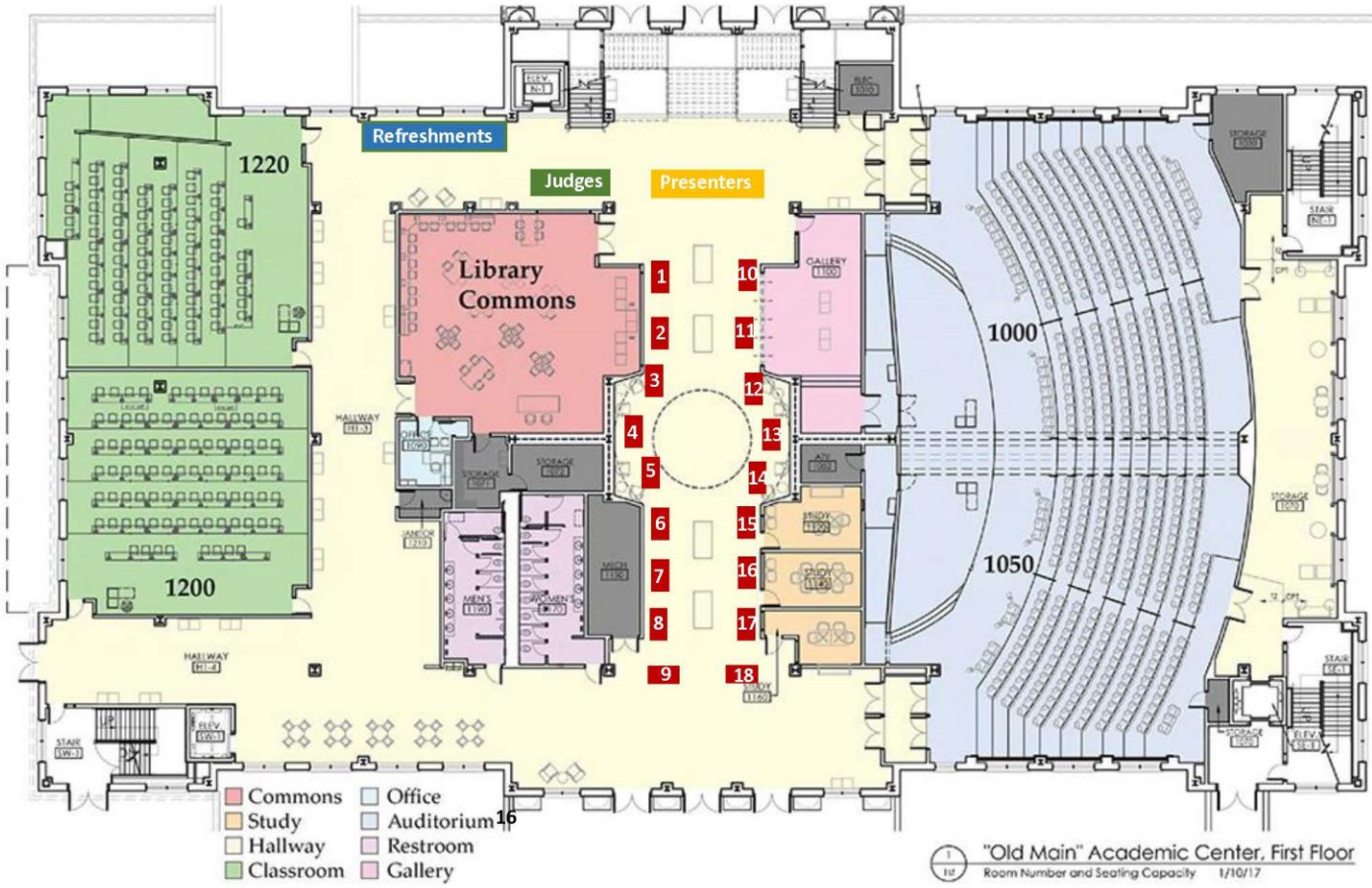
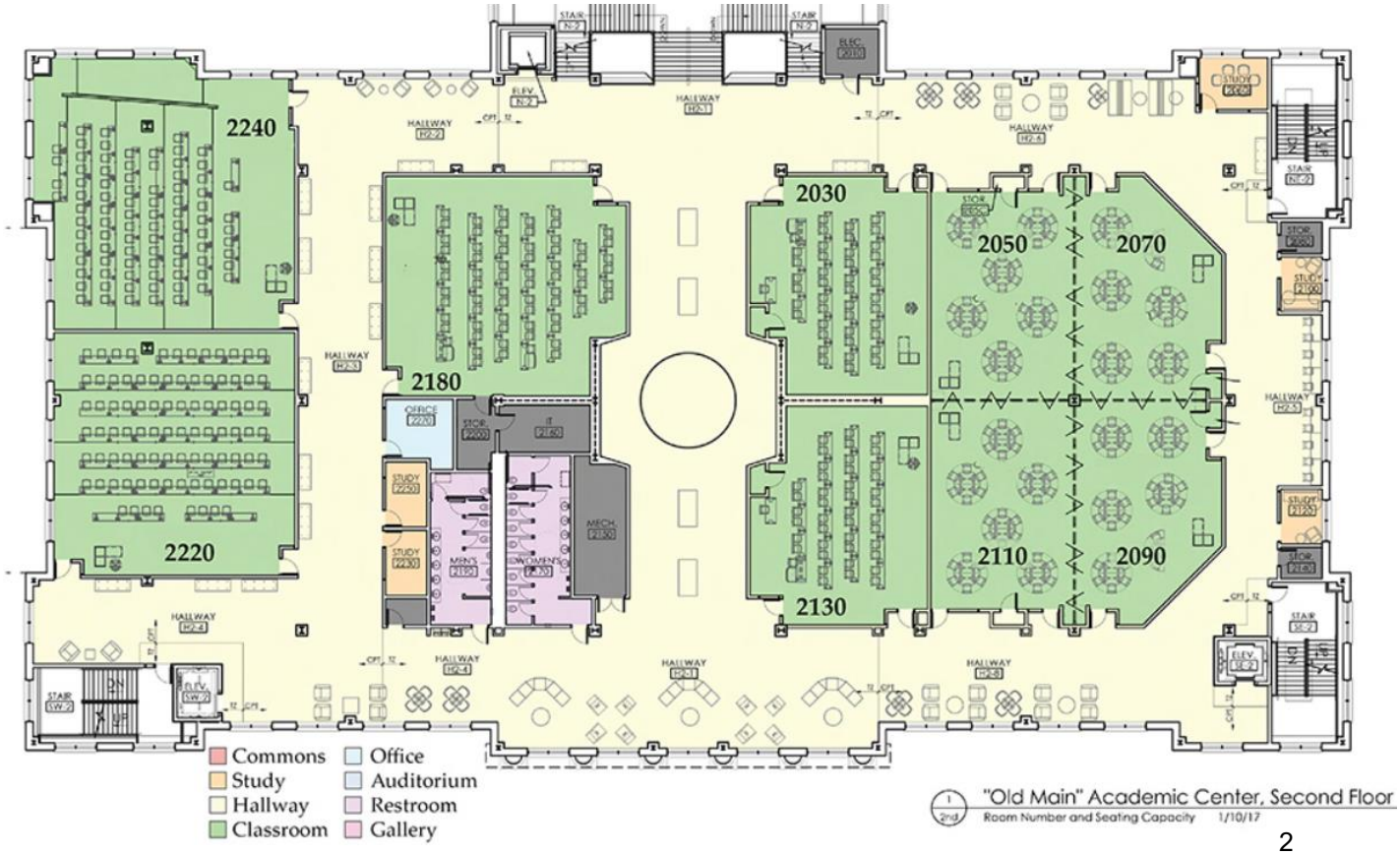


SIGN IN STUDENTS

SIGN IN JUDGES

Poster Presentations



Session Schedule Outline

Session	Session Code	Location	Time
AM Poster 1	MP1	1st Floor Lobby	8 AM – 9:45 AM
AM Poster 2	MP2	1st Floor Lobby	8 AM – 9:45 AM
AM Poster 3	MP3	1st Floor Lobby	10:00 AM – 11:45 AM
AM Poster 4	MP4	1st Floor Lobby	10:00 AM – 11:45 AM
AM Oral 1	MO1	Room 1220	8 AM – 9:30 AM
AM Oral 2	MO2	Room 1200	8 AM – 9:30 AM
AM Oral 3	MO3	Room 2180	8 AM – 9:30 AM
AM Oral 4	MO4	Room 2240	8 AM – 9:30 AM
AM Oral 5	MO5	Room 2030	8 AM – 9:30 AM
AM Oral 6	MO6	Room 1220	10 AM – 11:30 AM
AM Oral 7	MO7	Room 1200	10 AM – 11:30 AM
AM Oral 8	MO8	Room 2180	10 AM – 11:30 AM
AM Oral 9	MO9	Room 2030	10 AM – 11:30 AM
PM Poster 1	AP1	1st Floor Lobby	1:15 PM – 3:00 PM
PM Poster 2	AP2	1st Floor Lobby	1:15 PM – 3:00 PM
PM Oral 1	AO1	Room 1220	1 PM – 2 PM
PM Oral 2	AO2	Room 1200	1 PM – 2 PM
PM Oral 3	AO3	Room 2180	1 PM – 2 PM
PM Oral 4	AO4	Room 1220	2:30 PM – 3:30 PM
PM Oral 5	AO5	Room 1200	2:30 PM – 3:30 PM

MORNING SESSION: 8 AM—12 PM

Poster Sessions

Poster Session 1

8 AM – 9:45 AM

1st Floor Lobby – Posters 1-7

Moderator: Ana Valencia

Evaluators:

1. George Trawick, Computer Science and Engineering
2. Naflath Thenveettil, Plant and Soil Sciences

Participants:

1. Roberto Venta, Chemistry, *Alternative poly (ester acetal)s as degradable replacement for commodity plastics*
2. Pubuduni Ekanayaka, Physics and Astronomy, *High-resolution electric field mapping in RF plasma using an optically trapped single particle.*
3. Sushma Perati, Agricultural and Biological Engineering, *Characterization of Cotton Moisture Sensors: A study in Static and Dynamic Modes*
4. Sushma Bhattarai, Forestry, *Factors affecting landowners' preference for CWD management in the southern United States*
5. Sona Azad, Sustainable Bioproducts, *Research and demonstration of CLT production from downed pine timber*
6. Sijin Guo, Sustainable Bioproducts, *Optimizing Copper Loading for Enhanced Dispersion of Graphene-Encapsulated Cu^0 Nanoparticles Synthesized from Kraft Lignin*
7. Kevin Jones, Wildlife, Fisheries and Aquaculture, *eDNA detection of Walleye in eastern Mississippi streams*

Poster Session 2

8 AM – 9:45 AM

1st Floor Lobby – Posters 10-18

Moderator: Ana Valencia

Evaluators:

1. Julie Herbstrith, Counseling, Higher Education Leadership, Educational Psychology, and Foundations
2. KC New, MSU Libraries
3. Kristin Javorsky, Teacher Education and Leadership

Participants:

1. Madeline Ballinger, Anthropology and Middle Eastern Cultures, *Put Ribole: Exploring Secondary Mortuary Interactions at a Late Antique Site in Trogir, Croatia*
2. Brittany C Brown, Anthropology and Middle Eastern Cultures, *Surviving Trauma: Exploring Mandibular Injury and Care in a Commingled Burial at Tell Abraq*
3. Alexis Cutshall, Anthropology and Middle Eastern Cultures, *Community Engaged Archaeology at the Prospect Hill Plantation in Jefferson County, Mississippi*
4. Will Laird, Geoscience, *An Apatite for Iodine*
5. Nafiz Rahaman, Geosciences, *Persistent Extreme Heat Exposure Among Socially Vulnerable Communities in the Contiguous United States: A Two-Decade Analysis*
6. Nishat Shermin, Geosciences, *A Comparative Machine Learning Approach Integrating UAV and Multispectral Imagery for Classifying Fractional Vegetation Cover in Rangelands*
7. Maria V. Bracamonte, Management, *The effects of individual political reputations on perceiver emotional and behavioral reactions: an attribution theory perspective*
8. Nicole Colón-Bosques, Psychology, *Executive Functions as a mediator between ADHD symptoms and anxiety and depressive symptoms in emerging adults*
9. Kristina Schoenthaler, Psychology, *Caregiving Status of Dependent Children as a Predictor of Well-Being in Retired Grandparents*

Poster Session 3

10 AM – 11:45 PM

1st Floor Lobby – Posters 1-6

Moderator: Palani Ganesh Karthikeyan

Evaluators:

1. Naflath Thenveettil, Plant and Soil Sciences
2. Angelica Abdallah-Ruiz, Biochemistry, Nutrition & Health Promotion

Participants:

1. Sharon Damilola Samuel, Biochemistry, Nutrition and Health Promotion, *Association Between Food Security, Dietary Quality, and Diagnosed Periodontitis: Analysis of NHANES 2015-2018*
2. Rezwana Rahman Setu, Biochemistry, Nutrition and Health Promotion, *Analysis of Systemic Acquired Resistance by Monitoring Redox-Mediated Transcriptional Dynamics in Arabidopsis*
3. Prattay Dey, Biological Sciences, *Investigating Annexin A2 as a Common Receptor for Streptococcus pneumoniae on Human Epithelium*
4. Mohan Kumar Bista, Plant and Soil Sciences, *Heat and drought stress: their combined impact on cotton physiology and agronomic performance*
5. Alekhya Chakravaram, Plant and Soil Sciences, *Drought and Warmer Nights Effects on Cowpea Physiology and Yield*
6. Bala Subramanyam Sivarathri, Plant and Soil Sciences, *Effects of Temperature Stress and Biostimulants on Root and Shoot Parameters of Soybean*

Poster Session 4

10 AM – 11:45 PM

1st Floor Lobby – Posters 10-15

Moderator: Palani Ganesh Karthikeyan

Evaluators:

1. Sara Vick, Business Information Systems
2. Chiranjibi Shah, Northern Gulf Institute

Participants:

1. Ander Talley, Computer Science, *Binary Point Cloud Encoding*
2. Qing Liu, Computer Science and Engineering, *Multilinear principal component analysis enabled multi-sensor fusion for rotatory machine fault diagnosis*
3. Sabyasachi Biswas, Electrical and Computer Engineering, *HRSpecNet: Deep Learning Based High-Resolution Time Frequency Analysis*
4. Hossein Mohammadi, Electrical and Computer Engineering, *AI-Assisted Network Slicing in O-RAN Architecture Using Federated Learning*
5. Mohammad Abdus Shahid Rafi, Electrical and Computer Engineering, *Crop Yield Estimation of Corn and Cotton utilizing feature selection techniques and machine learning models on multi-sensor data from UAS.*
6. Mahfuzur Rahman, Electrical and Computer Engineering, *Traffic light recognition and V2I communication between the autonomous car and traffic lights using MAVS simulation and YOLOv8*

Oral Sessions

Oral Session 1

8 AM – 9:30 AM

Room 1220

Moderator: Palani Ganesh Karthikeyan

Evaluators:

1. Sid Creutz, Chemistry
2. Sean Stokes, Chemistry

Participants:

1. Miguel Cabrera, Chemistry, *Nickel Complexes with Silyl-Phosphine and Silane-Phosphine Ligands as Dual Catalysts for the Selective Alkene Hydrosilylation and Aldehyde Hydroboration*
2. Olufemi Farotimi, Chemistry, *How might HDX Improve Isomer Differentiation in the Mass Spectrometric Analysis of Metabolites?*
3. Vaishali Kshirsagar, Chemistry, *Colloidal synthesis of Se alloyed BaZrS3 perovskites*
4. Daniel Oguntuyi, Chemistry, *Synthesis and characterization of calcinated Fe3O4-kaolin nanocomposite for efficient aqueous Brilliant Blue dye adsorption*
5. Chibuike Onyeogulu, Chemistry, *Detection of Ionic Liquid Cations from Dilute Aqueous Solutions using Direct Analysis in Real Time Mass Spectrometry (DART-MS)*
6. Arma Regmi, Chemistry, *High Performance Iron Anode with ZnS Additive*

Oral Session 2

8 AM – 9:30 AM

Room 1200

Moderator: Lorena Benavides-Riano

Evaluators:

1. George Awuni, Plant and Soil Sciences
2. Ling Li, Biological Sciences

Participants:

1. Ruchita Bhattarai, Plant and Soil Sciences, *Climate Change Impact Assessment in Nepal and Bangladesh: An Ensemble Climate Modelling Approach*
2. Vijaykumar Hosahalli, Plant and Soil Sciences, *Chilling Tolerance of Diverse Soybean Genotypes during Seedling Emergence*
3. Alyssa Lea Miller, Plant and Soil Sciences, *Sweetpotato (Ipomea batatas) Variety Tolerance to Different Herbicidal Weed Control Methods*
4. Sujan Poudel, Plant and Soil Sciences, *Effects of Water Deficit on Cowpea: Physiology, Yield, and Quality*

Oral Session 3

8 AM – 9:30 AM

Room 2180

Moderator: Julie Stepp

Evaluators:

1. Madhav Dhakal, Mississippi Water Resources Research Institute
2. Marcus McGee, Animal and Dairy Sciences

Participants:

1. Yasas Gamagedara, Agricultural and Biological Engineering, *Harmonizing Spectral Data Between Fourier Transform Infrared Spectrometers to Accurately Predict Soil Carbon*
2. Gifty Lad Ayela, Agricultural Economics, *Developing Site-Specific Water Response Functions using Historical Soil Moisture Data*
3. Caren Mwange, Agricultural Economics, *Regional Economic Resilience to Natural Disasters: Analyzing the role of community preparedness in accelerating hurricane recovery in the US*
4. Afra Anan Bhuiyan, Biochemistry, Nutrition and Health Promotion, *Validation of Positional Candidates Rps6ka6 and Pou3f4 for a Locus associated with Skeletal Muscle Mass Variability*
5. Patricia Marie Cordero-Irizarry, School of Human Sciences, *From Bricks to Soil: Developing the 4-H LEGO® Club Soil Curriculum*

Oral Session 4

8 AM – 9:30 AM

Room 2240

Moderator: Kendall McKinnon

Evaluators:

1. Michelle Taylor, Management and Information Systems
2. Matt Peaple, Shackouls Honors College
3. Iva B. Ballard, Marketing, Quantitative Analysis, and Business Law
4. Lu He, Marketing, Quantitative Analysis, and Business Law

Participants:

1. Zach Dykema, Biological Sciences, *Genetic impacts of serial bottlenecking in translocated populations of the Anegada rock iguana (Cyclura pinguis)*
2. Ryan Paulk, Biological Sciences, *Evaluating the potential for fumonisin B1 remediation through insect farming*
3. Hafez Ahmad, Geosciences, *Modeling Hypoxia in the Gulf of Mexico: A Machine Learning Approach with Remote Sensing and Field Data*
4. Udit Bhatta, Geosciences, "*Bridging the gaps: assessing flood resilience capacity across Mississippi's vulnerable communities*"
5. Salman Bashit, Geosciences, *Developing practicability envelopes for UAS bathymetric echo sounder data collection in a Mississippi inland waterbody*
6. Trinity Baynham, History, *Coated in Colonialism*

Oral Session 5

8 AM – 9:30 AM

Room 2030

Moderator: Alberta Asi Ebeheakey

Evaluators:

1. Galen Collins, Biochemistry, Nutrition, and Health Promotion
2. W. Brien Henry, Plant and Soil Sciences

Participants:

1. Oluwabori Adekanye, Comparative Biomedical Sciences, *CES1 inactivation actively initiates NLRP3 inflammasomes activation in human macrophages.*
2. Arpita Deb, Comparative Biomedical Sciences, *Investigating the effects of Aryl Hydrocarbon Receptor (AHR) ligands on Fcy receptor signaling in innate cells*
3. Divya Rose, Pathobiology and Population Medicine, *Searching for the Environmental Reservoirs of Antibiotic Resistance in Commercial Catfish Ponds in the Mississippi Delta*
4. Ridwan T. Ayinla, Sustainable Bioproducts, *Electrode and electrolyte derived from pine biomass for sustainable high-performance supercapacitor*

Oral Session 6

10 AM – 11:30 AM

Room 1220

Moderator: Alberta Asi Ebeheakey

Evaluators:

1. Madhav Dhakal, Mississippi Water Resources Research Institute
2. Enock Amoateng, Chemistry

Participants:

1. Kaitlyn Gordon, Agricultural and Biological Engineering, *Geospatial Analysis of Biomass Supply and Energy Need to Increase Resiliency in Rural Mississippi*
2. Cooper Little, Agricultural and Biological Engineering, *Site Specific Management of Iron Deficiency Chlorosis*
3. Sam Theobald, Agricultural and Biological Engineering, *Low-Cost Precision Agriculture Solutions for Advancing Irrigation Efficiency*
4. Flynn Mabowitz, Agricultural and Biological Engineering, *Finite element analysis of HeLa cell deformations via acoustic tweezers*
5. Sushma Perati, Agricultural and Biological Engineering, *Evaluation and Characterization of Capacitive sensors for Cotton Moisture Measurement*
6. Thevathayarajh Thayananthan, Agricultural and Biological Engineering, *Cotton boll localization system to enable autonomous cotton-picking using YOLO and SAM*

Oral Session 7

10 AM – 11:30 AM

Room 1200

Moderator: Kendall McKinnon

Evaluators:

1. Ling Li, Biological Sciences
2. Marcus McGee, Animal and Dairy Sciences

Participants:

1. Himani Joshi, Animal and Dairy Sciences, *In vitro Assessment of the Neuroactive Potential of the Rumen Microbiome*
2. Leticia Orellana, Poultry Science, *Effect of translucency and eggshell color on broiler breeder egg hatchability and hatch chick weight*
3. Crystal Lodi Conde, Wildlife, Fisheries and Aquaculture, *Evaluating the physiological responses with the inclusion of soy lecithin, and catfish oil in the production performance of channel catfish (ictalurus punctatus)*
4. Jing Huang, Wildlife, Fisheries and Aquaculture, *Autochthonous Probiotics, Lactococcus lactis Isolate MA5, From Hybrid Catfish (Ictalurus punctatus × I. furcatus) Improve in Acute Hypoxia Stress Recovery*
5. Daniel Egerson, Wildlife, Fisheries and Aquaculture, *Analyzing Perspectives on the Motivations and the Knowledge Gaps Impacting CRP Participation in the Midwest and Southern United States*
6. Basant Pant, Wildlife, Fisheries and Aquaculture, *Wildlife Acceptance Capacity: A Systematic Literature Review from Conceptualization to Application*

Oral Session 8

10 AM – 11:30 AM

Room 2180

Moderator: Gifty Lad Ayela

Evaluators:

1. Iva B. Ballard, Marketing, Quantitative Analysis, and Business Law
2. Lu He, Marketing, Quantitative Analysis, and Business Law

Participants:

1. Bowen Cai, Advanced Composites Institute, *Guided wave sensing based mechanical properties characterization for 3D printed thermoset composites*
2. Rohini Maram, Computer Science and Engineering, *Deep learning- based automated detection and classification of foreign materials in poultry using color and hyperspectral imagery*
3. Cemre Omer Ayna, Electrical & Computer Engineering, *Learning Optimal Discrete Color Filter Arrays with Trainable Hard Thresholding*
4. Abdur Rahman, Industrial and Systems Engineering, *Integrating Texture Features and Domain Adaptation for Robust Cross-Domain Moisture Content Prediction in Wood Chips*
5. Yukai Ai, Physics and Astronomy, *Characterization of single atmospheric particles in real aerosol state using optical trapping- Raman spectroscopy*

Oral Session 9

10 AM – 11:00 AM

Room 2030

Moderator: Oluwabori Adekanye

Evaluators:

1. Galen Collins, Biochemistry, Nutrition, and Health Promotion
2. Olufunke Ogundimu, English

Participants:

1. Sushma Bhattarai, Forestry, *Does collective action affect landowner willingness to manage Chronic Wasting Disease on their land?*
2. Samjhana Panthi, Forestry, *Impact of timber price trend and volatility on Loblolly pine plantation optimal rotation age in the US South*
3. Nasir Qadir, Forestry, *Geographic Influence on Stem Taper of Loblolly Pine (Pinus taeda) in Southern U.S. Forests*

AFTERNOON SESSION: 1 PM—3:30 PM

Poster Sessions

Poster Session 1

1:15 PM – 3:00 PM, 1st Floor Lobby – Posters 1-9

Moderator: Hemraj Kathayat

Evaluators:

1. Suraj A Yadav, Agricultural and Biological Engineering
2. Hala El Daous, Animal and Dairy Sciences
3. Fernando Yamamoto, Delta Research and Extension Center
4. Raju Bheemanahalli, Plant and Soil Sciences
5. Nisarga K Narayana, Plant and Soil Sciences

Participants:

1. Himani Joshi, Animal and Dairy Sciences, *Development of a Menthol-Based Heat Stress Mitigation Strategy via Vagus Nerve Stimulation in Dairy Cattle*
2. Afra Anan Bhuiyan, Biochemistry, Nutrition and Health Promotion, *Investigating the Biocontrol Activity of Root Endophytes against Fungal Pathogen Xylaria necrophora in Soybean*
3. Quazi Md Fazle Hasan Fahim, Landscape Architecture, *Vulnerability to resilience: shoreline typologies for climate change adaptation and thriving communities in Biloxi, Mississippi*
4. Anitha Madapakula, Plant and Soil Science, *Impact of Climate Change in the Productivity of Major Field Crops in Senegal Using the DSSAT Simulation Model*
5. Prasanna Bayalusime, Plant and Soil Sciences, *Climate Change Impact Assessment and Adaptation and Mitigation Measures for Major Field Crops in Guatemala: Feed the Future Countries*
6. Sujan Poudel, Plant and Soil Sciences, *Quinoa Drought Tolerance: Morpho-physiological Responses During Flowering*
7. Jing Huang, Wildlife, Fisheries and Aquaculture, *Assessing Animal By-products and Soybean Meal as Potential Fish Meal Replacements in Channel Catfish (Ictalurus punctatus) Feeds*
8. Mohammadali Monfared, Agricultural and Biological Engineering, *Computational Modeling of Seismocardiography Signals for Enhanced Screening of Congenital Heart defects*
9. Fasiha Zainab, Electrical and Computer Engineering, *Managing Equality and Equity in Load Shedding for Wildfire Mitigation*

Poster Session 2

1:15 PM – 3:00 PM

1st Floor Lobby – Posters 10-17

Moderator: Ruchita Bhattarai

Evaluators:

1. Rizwan Farooqui, Building Construction Science
2. Soyoun Lim, Kinesiology
3. Arun Venugopalan, Pathobiology and Population Medicine
4. Kathleen Ragsdale, Social Science Research Center

Participants:

1. Lydia Bailey, Anthropology and Middle Eastern Cultures, *Racialized disparities in respiratory disease: documented causes of death in a historic population from Cleveland, Ohio*
2. Daniel O. Oguntuyi, Chemistry, *Synthesis and characterization of calcinated Fe3O4-kaolin nanocomposite for efficient aqueous Brilliant Blue dye adsorption*
3. Xinyu Xie, Psychology, *Comparing Theories that Posit a Role for Task Features in Strategy Selection*
4. Khadija Ferdous, Clinical Sciences, *Comprehensive analysis of genotype and phenotype of veterinary Enterobacterales isolates for cephalosporin antibiotics*
5. Carlos Rivera, Forestry, *Integrative genomic annotation of Populus deltoides*
6. Ridwan T. Ayinla, Sustainable Bioproduct, *Electrode and electrolyte derived from pine biomass for sustainable high-performance supercapacitor*
7. Abigael Nasimiyu Laisa, Sustainable Bioproducts, *Guayule Resin as a Natural Wood Preservative*
8. Daniel Egerson, Wildlife, Fisheries and Aquaculture, *Addressing Information Gaps in the U.S. Conservation Reserve Program: Exploring the Potential of the CRP Menu Tool to Enhance Landowner Decision Making*

Oral Sessions

Oral Session 1

1:00 PM – 2:00 PM

Room 1220

Moderator: Kevin Jones

Evaluators:

1. Sid Creutz, Chemistry
2. Amanda Patrick, Chemistry

Participants:

1. Fernanda Garcia, Chemistry, *Oxidation of Non-Activated Alkenes with a Pentadentate Manganese Complex and Mild Oxidants*
2. Hari Giri, Chemistry, *Uniaxial and coaxial electro-spun micro/nanofibers from phenothiazine-derived polyaniline*
3. Samuel Juarez, Chemistry, *Synthesis and Characterization of (CCC-NHC) Mo Pincer Complexes and Non-Pincer Binding Modes*
4. Loan TT. Nguyen, Chemistry, *Designing Carbonic Anhydrase Inhibitors: Chemistry Insights from Molecular Dynamics Simulations and Experiments*

Oral Session 2

1:00 PM – 2:00 PM

Room 1200

Moderator: Fnu Anshu

Evaluators:

1. Ayoung Kim, Agricultural Economics
2. Paula Mabry, Communication

Participants:

1. Alexis Cutshall, Anthropology and Middle Eastern Cultures, *Community Engaged Archaeology at the Prospect Hill Plantation in Jefferson County, Mississippi*
2. Md Nurul Islam, Finance and Economics, *Politician Personal Misconduct and Congressional Insider Trading*
3. Berna Altunisik, Psychology, *Individual Differences in Attention and Creative Thinking*

Oral Session 3

1:00 PM – 2:00 PM

Room 2180

Moderator: Samrat Sikdar

Evaluators:

1. Serge Leugoue Kameni, Animal and Dairy Sciences
2. Lekshmy V. Sankarapillai, Plant and Soil Sciences
3. Varsha Singh, Plant and Soil Sciences

Participants:

1. Bipin Bastakoti, Plant and Soil Sciences, *Assessing Soil Health and Land-Use Sustainability in Vermilion-Teche Basin, Louisiana*
2. Mohan Kumar Bista, Plant and Soil Sciences, *Physiological and morphological traits resilience of finger millet to drought Stress*
3. Abhishek Panchadi, Plant and Soil Sciences, *Estimation of Soil Organic Carbon Using Hyperspectral Indices Obtained from Proximally Sensed Data and Prediction Using Machine Learning Models*
4. Bala Subramanyam Sivarathri, Plant and Soil Sciences, *Response of Soybean Roots and Nodules to Water-Deficit Conditions*

Oral Session 4

2:30 PM – 3:30 PM

Room 1220

Moderator: Mohammad Nafe Assafi

Evaluators:

1. Shiveeli Rajput, Animal and Dairy Sciences
2. Bikash Adhikari, Plant and Soil Sciences
3. Luis Rolando Munoz, Poultry Science

Participants:

1. Rezwana Rahman Setu, Biochemistry, Nutrition and Health Promotion, *Analysis of Systemic Acquired Resistance by Monitoring Redox-Mediated Transcriptional Dynamics in Arabidopsis*
2. C. Camilo Suarez Barazeta, Wildlife, Fisheries and Aquaculture, *Production Performance of Channel Catfish (Ictalurus punctatus) Juveniles Fed Diets Supplemented with Carvacrol*
3. Emma Schultz, Wildlife, Fisheries and Aquaculture, *Assessing sampling bias across aerial monitoring strategies among animal movements, distributions, and densities*
4. 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

2:30 PM – 3:30 PM

Room 1200

Moderator: Tammie Bowles

Evaluators:

1. Mohammad Muntasir Rahman, Agricultural and Biological Engineering
2. Yan Sun, Industrial Technology, Instructional Design, and Community College Leadership
3. Sheida Riahi, Marketing, Quantitative Analysis, and Business Law

Participants:

1. Md Nurul Islam, Finance and Economics, *Decoding Noncompliance: Are Politicians' Delinquent Financial Disclosures Informative?*
2. Mohammad Shakiul Islam, Geosciences, *Spatiotemporal Dynamics of Cyanobacterial Blooms: Integrating Machine Learning and Feature Selection Techniques with Uncrewed Aircraft Systems and Autonomous Surface Vessel Data*
3. Madeline Burdine, Social Science Research Center; Sociology, *Can a Locally Source Dried Fish Powder Tackle Nutritional Gaps among Vulnerable Infants and Young Children in Zambia: Nutrient Analysis and Sensory Panel Results for Complementary Food for Africa+Dried Fish Powder (ComFA+Fish)*
4. Sultan Mohammad Manjur, Electrical and Computer Engineering, *Automated Detection of Seafloor Gas Seeps in Multibeam Echosounder Data with an Attention-Guided Convolutional Neural Network*

Presenters and Abstracts

Presenter: Oluwabori Adekanye

Presentation Session: MO5

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr Mathhew Ross, Professor, Department of Comparative Biomedical Sciences.

Title: CES1 inactivation actively initiates NLRP3 inflammasomes activation in human macrophages

Abstract: The NOD-like receptor pyrin domain-containing protein 3 (NLRP3) inflammasome is central to innate immunity. This inflammasome triggers the maturation of immature interleukin 1 beta, (IL1β) interleukin 18 and their consequent extracellular release. It is also essential in pyroptotic cell death. Over activation of NLRP3 release interleukin 1 beta which contribute to hyperinflammation and lead to onset and progression of some diseases. Carboxylesterase-1(CES1) is a serine hydrolase that hydrolyzes ester containing compounds, drugs, pesticides and activate pro-drugs. A recent study showed that the presence of CES1 in human monocytes/macrophages hydrolyzes a pro drug to an active inhibitor of NLRP3 activity. Here we report that CES1 deficient human macrophages (CES1KD) express more NRLP3 gene and secrete more IL1β over a time course of 24 hours than control. Western blot also revealed increase production of pro-IL1β and pro-caspase 1 proteins in CES1KD macrophages. Inhibition of NLRP3 led to the reduction in the secretion of IL1 β proteins in CES1KD. Finally, NF-kβ which is a master regulator of the expression and NLRP3, pro-IL1 β and pro-caspase 1 transcription was also increased in CES1KD macrophages. These evidences shows that CES1 might be responsible for hydrolyzing an endogenous substance whose product might have a regulatory role on NLRP3 activation. This discovery demonstrates CES1 potential to help regulate or slow the progression of inflammation related diseases. [NIH R15HL157818-01A1]

Presenter: Hafez Ahmad

Presentation Session: MO4

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Padmanava Dash

Title: Modeling Hypoxia in the Gulf of Mexico: A Machine Learning Approach with Remote Sensing and Field Data

Abstract: Increasing occurrence, and frequency of hypoxia, characterized by lower dissolved oxygen levels in the inner continental shelf of the Gulf of Mexico (GoM), pose an increasing threat to marine ecosystems and the food chain. Reliable estimation and prediction of hypoxia events and their ever-expanding spatial extent along the Louisiana-Texas shelf is essential for the effective management of marine resources in the region. This study leverages field data and remote sensing techniques to train machine learning models for classifying hypoxic patches in the northern and eastern regions of the GoM. The top-performing models, Random Forest and XGBoost, demonstrated superior results, with accuracy, precision, recall, and F1-score all surpassing 92%. Analysis reveals significant variations in the extent of hypoxic areas across seasons, with peak occurrences during the summer months. The mean hypoxic area during summer spans approximately 69,363.072 km^2, reaching a maximum of 169,890.100 km^2. Hypoxic regions are predominantly detected near the coast, particularly within river mouths, with notable concentrations observed under the Mississippi and Atchafalaya rivers. Additionally, smaller rivers such as the Apalachicola River, Pearl River, and Suwannee River exhibit elevated densities of hypoxic zones. Comprehending and precisely delineating hypoxic zones is paramount for formulating effective management strategies, as these areas have profound implications for the economy, particularly in sectors such as fisheries and tourism along the Gulf Coast of the USA. Accurate mapping of hypoxic areas provides valuable insights into the spatial and temporal dynamics of oxygen-depleted regions, facilitating targeted interventions to mitigate their impact on marine ecosystems and associated economic activities. By identifying hypoxic hotspots and assessing their variability across seasons, this study contributes essential information for informed decision-making and sustainable resource management in the region. Additionally, the findings underscore the interconnectedness between environmental health and economic vitality, emphasizing the need for collaborative efforts to preserve the ecological integrity and economic resilience of the Gulf Coast.

Presenter: Yukai Ai

Presentation Session: MO8

Level of Study: PhD

Department: Physics and Astronomy

Category: Engineering

Advisor: Chuji Wang

Title: Characterization of single atmospheric particles in real aerosol state using optical trapping-Raman spectroscopy

Abstract: New technologies for the characterization and detection of aerosols are essential for modeling airborne transmission, risk estimate, and better understanding of aerosol properties and their temporal evolution in the atmosphere. In current laboratory and field studies, aerosol samples are either collectively or individually placed on a substrate or in a sample holder for subsequent measurements that may experience signal interference from particle-surface contamination or modification. Here we present a time-resolved, optical trapping, single-particle technology and apply it to characterize atmospheric particles in their native aerosol state that are freely suspended in air. Results show that we not only observed time variations of the physical and chemical properties of single-trapped particles but also specified several individual chemical function groups that undergo chemical reactions. This work demonstrated that single particle technology is a powerful technology for the characterization of physical, chemical, and biological properties of single atmospheric particles in their natural environment.

Presenter: Berna Altunisik

Presentation Session: AO2

Level of Study: PhD

Department: Psychology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Andrew F. Jarosz, Associate Professor, Psychology

Title: Individual Differences in Attention and Creative Thinking

Abstract: Dispersed and controlled attention are known to benefit different stages of creative thinking. Mind wandering might be a candidate for one of the dispersed attentional events that contributes to creativity. However, findings on this hypothesis are mixed showing both positive and negative effects of mind wandering. With two experiments, the study aimed to address the contexts that can produce these discrepant findings. The first experiment found that the interaction of constrained thoughts and intentional mind wandering positively predicted creative problem solving only in one context and not in another. The second experiment found that higher attention control ability predicted multiple measures of creativity, and the trait of intentional mind wandering predicted creative problem solving. Future research will focus on identifying contexts that produce productive mind wandering episodes.

Presenter: Gifty Lad Ayela

Presentation Session: MO3

Level of Study: Master's

Department: Agricultural Economics

Category: Agriculture and Life Sciences

Advisor: Dr. Xiaofei Li

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: Ridwan T. Ayinla

Presentation Session: AP2

Level of Study: PhD

Department: Sustainable Bioproduct

Category: Forest Resources and Veterinary Medicine

Advisor: El-Barbary Hassan, Professor, Sustainable Bioproduct

Title: Electrode and electrolyte derived from pine biomass for sustainable high-performance supercapacitor

Abstract: We successfully developed a novel hydrogel electrolyte and activated carbon materials derived from pine biomass. The hydrogel electrolyte, prepared by crosslinking cellulose nanofibers extracted from pine wood with Cu2+ ions, demonstrated a high ionic conductivity of 68.78 mS/cm. Concurrently, we optimized activated carbon derived from pine bark using chemical activation with phosphoric acid (H3PO4), potassium hydroxide (KOH), and zinc chloride (ZnCl2) separately. The best-performing activated carbon (AC-H-1000) exhibited a remarkable specific capacitance of 470.58 F/g at 0.5 A/g, attributed to its large surface area of 1016.93 m2/g. We further assembled the optimized electrode and electrolyte in a two-electrode supercapacitor configuration (AC-H-1000//Cu2+-CNF//AC-H-1000), this system achieved a high energy density of 17.9 Wh/kg, an exceptional power density of 21489 W/kg, and maintained a capacitance retention of 73.56% after 1000 charge-discharge cycles. These findings underscore the significant potential of biomass-derived materials for advancing renewable, energy storage technologies.

Presenter: Ridwan T. Ayinla

Presentation Session: MO5

Level of Study: PhD

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: El-Barbary Hassan

Title: Electrode and electrolyte derived from pine biomass for sustainable high-performance supercapacitor

Abstract: We successfully developed a novel hydrogel electrolyte and activated carbon materials derived from pine biomass. The hydrogel electrolyte, prepared by crosslinking cellulose nanofibers extracted from pine wood with Cu2+ ions, demonstrated a high ionic conductivity of 68.78 mS/cm. Concurrently, we optimized activated carbon derived from pine bark using chemical activation with phosphoric acid (H3PO4), potassium hydroxide (KOH), and zinc chloride (ZnCl2) separately. The best-performing activated carbon (AC-H-1000) exhibited a remarkable specific capacitance of 470.58 F/g at 0.5 A/g, attributed to its large surface area of 1016.93 m2/g. We further assembled the optimized electrode and electrolyte in a two-electrode supercapacitor configuration (AC-H-1000//Cu2+-CNF//AC-H-1000), this system achieved a high energy density of 17.9 Wh/kg, an exceptional power density of 21489 W/kg, and maintained a capacitance retention of 73.56% after 1000 charge-discharge cycles. These findings underscore the significant potential of biomass-derived materials for advancing renewable, energy storage technologies.

Presenter: Cemre Omer Ayna

Presentation Session: MO8

Level of Study: PhD

Department: Electrical & Computer Engineering

Category: Engineering

Advisor: Ali Cafer Gurbuz, Electrical & Computer Engineering

Title: Learning Optimal Discrete Color Filter Arrays with Trainable Hard Thresholding

Abstract: Color Filter Arrays (CFA) are optical filters in digital cameras that capture specific color channels. Current commercial CFAs are hand-crafted patterns that are not necessarily optimal. This study proposes to learn a task-specific optimal binary CFA from data utilizing the proposed joint deep-learning architecture based on hard thresholding and deep learning-based demosaicing networks. Unlike existing learnable CFAs that learn a linear combination of color channels, the proposed method learns to select only one color channel at each pixel, resulting in CFAs that are practical and physically implementable to digital cameras. The binary selection is based on adapting the hard thresholding operation into neural networks via a straight-through estimator. The learned binary masked image is reconstructed into a color image through a novel demosaicing architecture. Both color filter and demosaicing network are jointly learned over a training dataset to minimize the reconstruction loss. Hence an optimal binary CFA is learned for the task of image reconstruction for the training dataset. The proposed approach is tested with Kodak and BSDS500 datasets. Our results indicate that CFAs learned with the proposed approach provide a higher reconstruction performance than the hand-designed filters like Bayer or alternative learned CFAs. Analysis of different demosaicing models, color configurations, CFA sizes, and training dataset size are provided.

Presenter: Sona Azad

Presentation Session: MP1

Level of Study: PhD

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Laya Khademibami

Co-Advisor: Dr. Rubin Shmulsky, Dr. Daniel Seale, Dr. Grant Kirker

Title: Research and demonstration of CLT production from downed pine timber

Abstract: This study investigates the use of downed pine timber for producing cross-laminated timber (CLT) panels, aiming to develop a sustainable process that repurposes storm-damaged wood into valuable construction materials. The research examines the quality of timber collected at different intervals (0, 6, 9, and 12 months) post-felling, simulating natural degradation conditions.

Key objectives include assessing the mechanical properties of lumber and CLT panels through nondestructive evaluation (NDE) methods, such as acoustic velocity (AV) and dynamic modulus of elasticity (MOE), as well as destructive testing. NDE techniques was used to measure the quality of lumber prior to CLT panel production, ensuring that the material meets performance standards.

This study aims to demonstrate the feasibility and benefits of using downed timber in CLT production, offering an eco-friendly and cost-effective alternative to traditional raw materials. The findings will highlight the potential of downed timber CLT in sustainable construction, reducing waste, and enhancing resource efficiency in the industry.

Presenter: Lydia Bailey

Presentation Session: AP2

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

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

Title: Racialized disparities in respiratory disease: documented causes of death in a historic population from Cleveland, Ohio

Abstract: Public health literature suggests that Black and African American communities in the U.S. are disproportionately impacted by respiratory infections, resulting from inequities in healthcare, nutritional access, and reliable housing. This study seeks to add historical depth to ongoing research on racialized health disparities by analyzing archival death records from a 20th century population in Cleveland, Ohio. The sample comes from the Hamann-Todd Osteological Collection (HTOC), which consists of 3,000+ individuals who died in public institutions in Cleveland in the early 20th century and were anatomized by medical students at Western Reserve University. Utilizing documented causes of death from young individuals (age at death 0-18), we aim to determine whether individuals listed as "Black" in the HTOC database died from lower respiratory infections disproportionately to those listed as "White." The sample group (n=70) was categorized based on individuals' documented ancestry, then documented causes of death were classified as either respiratory (e.g., pulmonary tuberculosis, pneumonia) or non-respiratory (e.g., sepsis, chicken pox). A Chi-Square test of independence and Cramer's V were used to assess the relationship between documented ancestry and cause of death. Results indicated no statistically significant difference in respiratory infection rates between Black and White individuals, revealing a weak association. The findings suggest that both groups represent an unhealthy segment of Cleveland's population, possibly skewed by the demographic nature of the HTOC itself. Further anthropological research should consider variables such as biological sex, socioeconomic status, and additional physiological stressors, each of which potentially complicate the results of the study.

Presenter: Madeline Ballinger

Presentation Session: MP2

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Anna Osterholtz, Professor, Department of Anthropology and Middle Eastern Cultures

Title: Put Ribole: Exploring Secondary Mortuary Interactions at a Late Antique Site in Trogir, Croatia

Abstract: The brick-tomb burial at the site of Put Ribole in Trogir, Croatia consists

of a 5th century C.E. commingled skeletal assemblage excavated in 2020. This poster presents the results of a statistical analysis of element representation within the Put Ribole skeletal assemblage. The statistical analysis indicates that the brick-tomb burial had long-term usage and is a secondary burial site. This analysis is informative of the mortuary treatments present in Trogir during a period of mass migration and political, religious, and cultural change.

Presenter: Salman Bashit

Presentation Session: MO4

Level of Study: Master's

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope

Title: Developing practicability envelopes for UAS bathymetric echo sounder data collection in a Mississippi inland waterbody

Abstract: Rapid developments in bathymetric data collection technology and capabilities, especially miniaturization and mounting on unoccupied aerial systems (UAS)/drone platforms, have revolutionized the collection of 3-D data using active remote sensing sensors. Depth measurements of resources below water surfaces involve significant time, cost, labor, and technology-intensive tasks over various spatial scales that have variable success across the remote, dangerous, turbid, and tannic waters of the state. With a UAS platform, data can be collected quickly and safely, without the need for or with limited need for expensive and time-consuming, ground-based surveys or the use of specialized boats or aircraft. The main objective of the study was to test the relative capabilities of collecting UAS echo sounder-integrated bathymetric data and validate using a suite of ground-based techniques. A secondary objective was to determine the best-performing interpolation method for deriving Digital Elevation Models (DEMs) from UAS echo sounder data collected at varying data survey methods. Finally, the efforts have yielded extremely promising results. The study successfully obtained precise bathymetry data with centimeter-level accuracy as much as 0.5-meter resolution. These results will lead to time and cost savings through increased inspection capabilities, improved mapping and models of water-logged and water-covered areas, and more robust measurements of drainage system capacities for a variety of monitoring and planning applications. Moreover, UAS echo sounder data can be a useful tool to provide insights for 3-D mapping to bridge the gap between terrestrial and marine surveys as well as between the mapping of specific morphological elements and entire landscapes.

Presenter: Kerington Bass

Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Lorin Harvey, Plant and Soil Science

Co-Advisor: Dr. Guihong Bi, Plant and Soil Science

Title: The Assessment of Plant Growth Regulators on Sweetpotato Slip Propagation

Abstract: The sweetpotato production cycle involves several stages, each presenting unique challenges, particularly during the transplanted slip stage. Sweetpotato slips used for asexual propagation often exhibit non-uniform characteristics, complicating the transplanting process. Environmental hazards and varying greenhouse and field conditions further contribute to low transplant survival rates, posing logistical and financial difficulties. While plant growth regulators (PGRs) have been effective in reducing environmental stress and promoting lignification in other crops, their impact on sweetpotato slips remains underexplored. Mississippi State University is conducting greenhouse trials to improve transplant establishment rates and the quality of sweetpotato slips. This study employs a randomized full-block design to test various PGRs and their concentrations, aiming to identify the most effective PGR and application rate. Measurements of plant height, stem diameter, number of nodes, SPAD, leaf area, and water content were taken to assess the effects of PGRs on the slips. Among the treatments, uniconazole significantly reduced slip height, with the most notable reduction of 41.60% observed at 20 mg/L applied twice. Flurprimidol and uniconazole also decreased stem diameter at specific rates. Although IBA and paclobutrazol showed significant interactions over time, no individual differences were detected. Flurprimidol consistently increased leaf greenness, while other PGRs had varied effects. No significant differences were found in fresh and dry weights or leaf area. These findings underscore the variability in PGR effectiveness due to species-specific sensitivities, environmental conditions, and application methods, highlighting the need for further research to optimize PGR use in sweetpotato production.

Presenter: Bipin Bastakoti

Presentation Session: AO3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Assessing Soil Health and Land-Use Sustainability in Vermilion-Teche Basin, Louisiana

Abstract: It is estimated that nearly 2 billion ha of soil resources in the world have been degraded and the rate is accelerated due to a change in land use pattern. This study examines land-use land-cover changes in the Vermilion-Teche Basin from 2004 to 2022 and assesses soil health conditions. Land-use land-cover data from satellite (MODIS Land Cover-V6.1- MODIS MCD12Q1 V6.1) and ground observed data from the National Agricultural Statistics Service were used along with soil characteristics datasets from Web Soil Survey and Survey Geographic Database, and precipitation data from the National Oceanic and Atmospheric Administration. Our results suggested that the acreage of agricultural land in the Vermilion-Teche Basin had a downward trend, which declined from 29.36% in 2004 to 25.59% in 2022 of the total land area of the basin. Similarly, pastureland declined from 20.95% in 2004 to 15.02% in 2022. In contrast, the developed area increased from 1.85% in 2004 to 11.10% in 2022, indicating rapid urbanization and infrastructural development in the basin. Forested areas, wetlands, and water bodies remained relatively stable. An overlay analysis of the developed area and the soil map unit in the Vermilion-Teche Basin showed 17 out of a total of 332 soil map units accounting for one-third (31,685.56 ha) of the total developed area (99,932.79 ha) in the basin in 2022. The impervious surfaces in the built-up area obstruct rainwater infiltration, thereby increasing runoff and possible flooding downstream. These results indicate that the policymakers, land managers, and other stakeholders in the Vermilion-Teche Basin need to consider sustainable land use and soil and water conservation practices, especially in the developed areas of the basin to enhance environmental sustainability.

Presenter: Prasanna Bayalusime

Presentation Session: AP1

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Prakashkumar Jha, Assistant professor, Plant and Soil Sciences

Title: Climate Change Impact Assessment and Adaptation and Mitigation Measures for Major Field Crops in Guatemala: Feed the Future Countries

Abstract: ABSTRACT

Climate Change Impact Assessment and Adaptation and Mitigation Measures for Major Field Crops in Guatemala: Feed the Future Countries

Prasanna Bayalusime1, Ruchita Bhattarai1, Anitha Madapakula1, Prakash Kumar Jha1, Prakash K. Jha2

1Department of Plant and Soil Science, Mississippi State University, Mississippi, MS 39759 2UC Merced – Sierra Nevada Research Institute, Merced, CA 95343

Climate change poses a formidable threat to global agriculture, prompting research into its potential impacts based on the IPCC sixth assessment and various Representation Concentration Pathway (RCP) scenarios in Guatemala. The primary goal of the research is to develop effective adaptation and mitigation strategies to counter the adverse effects of climate change under different climatic models for major crops in Guatemala. First, the study was conducted on assessing impact of climate parameters under historical (1970-2000) and future (2025-2100) RCP 2.6 and RCP 8.5 climate change scenarios. We found that ensembling multiple climate models led to robust understanding of future climate conditions. Our ensembled climate model studies highlighted that for RCP 8.5 scenario rainfall had ranged from -28 % to 12 % and maximum temperature increased up to 6º C in Guatemala, from 2071 to 2100 in comparisons with historical data from 1970-2000. To assess the impact of climate change on major field crops, the DSSAT crop model was used to simulate crop growth and yield. The gridded soil database from Harvard data verse and downscaled weather data from climate model were used to run DSSAT for each grid to estimate crop yields. These yields reflect the impact of climate change on major crops in Guatemala. This research aims in strategizing adaptation and mitigating measures to minimize the adverse effects of climate change and evaluating climate resilient technologies for food production system.

Presenter: Trinity Baynham

Presentation Session: MO4

Level of Study: Master's

Department: History

Category: Education, Arts and Sciences, and Business

Advisor: Peter Messer, History

Title: Coated in Colonialism

Abstract: The Apsaalooke tribe has left significant influences of their culture around the country. Within the Mississippi State Special Collections, a preserved artifact, a partial jacket, from the Dr. Andrew Bowle's AB Holder collection is a remnant from 1887 presiding as a lens of the development of The Apsaalooke. Otherwise known as the Crow tribe, this nation is located on the Crow reservation in Montana. Like their given alternative name the Apsaalooke tribe has been fighting the rewritten history of their culture. In the shadow of colonialism, the crow women have become the protectors of Apsaalooke history.

Presenter: Udit Bhatta

Presentation Session: MO4

Level of Study: Master's

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope, Professor, Geosciences

Title: Bridging the gaps: assessing flood resilience capacity across Mississippi's vulnerable communities

Abstract:

The Southeast U.S., including Mississippi, faces the nation's highest incidence and cost of billion-dollar climate disasters. This region's climate variability, influenced by its latitude, topography, and proximity to the Atlantic Ocean and Gulf of Mexico, is further worsened by climate change, increasing the frequency and severity of extreme events like flooding. Socially vulnerable populations, burdened by high poverty rates, are at heightened risk.

Local governments are crucial first responders, but their capacity for flood management varies widely across Mississippi's 82 counties, leaving significant resilience gaps. This preliminary study evaluates flood resilience by assessing key indicators such as flood management ordinances and Geographic Information Systems (GIS) capabilities. Findings show that only 21% of counties have established GIS departments, and 19% lack any flood ordinance. Additionally, 25% of counties provide no clear information on their flood management practices. Using the CEJST tool, it is also found that In Mississippi, 48% of census blocks exceed the 75% federal poverty threshold, and 37% face flood risks above this same threshold.

By including additional variables, this study aims to identify barriers to implementing federal programs like FEMA's upcoming Federal Flood Risk Management Standard (FFRMS) implementation. Ultimately, it seeks to guide future initiatives in supporting underserved communities, enhancing flood resilience, and bridging the gap between policy and local-level action.

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: Climate Change Impact Assessment in Nepal and Bangladesh: An Ensemble Climate Modelling Approach

Abstract: Asian countries like Nepal and Bangladesh are significantly vulnerable to climate change. Small holder farmers in these countries face critical challenges of climate extreme during crop growth season. Moreover, several future climate studies have shown serious impact on food production system. To assess the changes in climate parameters, an ensembled study of climate model was conducted in Nepal and Bangladesh as Feed the Future countries. Climate data from three models (MPI, MOHC, and NCC) and two regional climate models, viz REMO and COSMO were used to calculate the change in precipitation, maximum and minimum temperature for near future (2026 – 2055) and far future (2071 – 2100) for RCP 2.6 and RCP 8.5 scenarios. Climate parameters (precipitation, maximum temperature and minimum temperature) were ensembled to minimize the discrepancies in each model. The ensembled suggests increase of 2.2 ℃ and 7.2 ℃ in maximum temperature for RCP 2.6 and RCP 8.5 respectively by 2100 in Nepal. Similarly, the future climate change analysis for MOHC-REMO, MPI-COSMO, MPI-REMO, NCC-COSMO and NCC-REMO in Bangladesh suggests 1.6, 1.0, 1.5, 1.1, 1.2 ℃ increase in maximum temperature for RCP 2.6 while 4.4, 4.1, 5.6, 3.2, 3.4 ℃ increase in maximum temperature for RCP 8.5 by 2100. Meanwhile, the ensembled suggests increase of 1.1 ℃ and 3.8 ℃ in maximum temperature for RCP 2.6 and RCP 8.5 respectively by 2100 in Bangladesh. Based on our analysis, we will compare ensembled climate parameters with individual models for impact assessment and evaluating adaptation and mitigation measures for food production system.

Presenter: Sushma Bhattarai

Presentation Session: MO9

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Rober K. Grala, Professor, Department of Forestry

Co-Advisor: Dr. Neelam C. Poudyal, Professor, University of Tennessee; Stephen C. Grado, Professor, Department of forestry; Daniel R. Petrolia, Professor, Department of Agricultural Economics

Title: Does collective action affect landowner willingness to manage Chronic Wasting Disease on their land?

Abstract: Chronic wasting disease (CWD) is a fatal disease transmissible affecting some animals from the Cervidae family such as white-tailed deer (Odocoileus virginianus), mule deer (Odocoileus hemionus), and elk (Cervus canadensis) in the United States. The ability of landowners to lease their land for hunting is contingent upon the health of game wildlife populations; however, the emergence of CWD threatens the hunting business and the associated local and state economies. CWD affects wide ecological and economic sectors, presenting a complex social challenge at the landscape level. This study employed a mail-back survey of private landowners in CWD-positive counties in Mississippi and Tennessee to determine whether collective action influences landowner willingness to manage CWD on their property. The majority of landowners were aware of the presence of CWD in both states and expressed a high-risk concern regarding the spread of CWD and venison consumption. Both group and personal efficacy were found to influence landowners' intention to manage CWD on their land. However, social norms and networks were not significant factors. The findings can assist wildlife managers in developing more effective strategies to increase landowner participation in CWD management.

Presenter: Sushma Bhattarai

Presentation Session: MP1

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Rober K. Grala, Professor, Department of Forestry

Co-Advisor: Dr. Neelam C. Poudyal, Professor, University of Tennessee; Dr. Stephen C. Grado, Professor, Department of forestry; Dr. Daniel R. Petrolia, Professor, Department of Agricultural Economics

Title: Factors affecting landowners' preference for CWD management in the southern United States

Abstract: Chronic wasting disease (CWD) is a fatal disease transmissible within the Cervidae family to animals such as white-tailed deer (Odocoileus virginianus). Since its initial detection in Colorado in the 1960s, the disease has spread to both wild and captive cervids in North America and Europe. CWD can result in a reduced survival rate, influence the population growth of the animals, and have undesired ecological and economic impacts. Effective CWD management necessitates active engagement from various stakeholders, including landowners. Given the limited research on disease management from a landowner perspective, this study investigated landowner behavior and intentions toward CWD and its management. This study determined landowners' behavioral intentions and preferences for managing CWD on their land. A mail-back survey was sent to randomly selected 4,000 landowners residing in CWD-affected counties in Mississippi and Tennessee. Most landowners were aware of the presence of CWD in both states and expressed a high-risk concern regarding its spread and venison consumption. In terms of behavioral intentions related to CWD management, landowners did not prefer actions such as allowing agency contractors to hunt on their property but were likely to report sick-looking deer, submit samples for testing, and disallow new mineral licks.

Presenter: Afra Anan Bhuiyan

Presentation Session: AP1

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Daniel Peterson

Co-Advisor: Dr. George Popescu

Title: Investigating the Biocontrol Activity of Root Endophytes against Fungal Pathogen Xylaria necrophora in Soybean

Abstract: Microbial communities associated with soybean roots play a crucial role in plant health and defense mechanisms. Taproot decline (TRD) of soybean, caused by the pathogen Xylaria necrophora, has become a significant concern in soybean production, particularly in the southern United States. However, little is known about TRD pathology and the role of plant microbial communities in its establishment. To address this gap, we previously conducted a study to characterize the fungal and bacterial taxa associated with healthy and TRD-affected soybean plants at different disease stages. Inspired by our initial findings, we then aimed to identify root endosphere bacteria responsible for specific soybean phenotypes. We investigated bacterial isolates for beneficial uses, such as improving plant growth and resistance against harmful pathogens. Finally, we conducted field trails to validate some of the discoveries made in the lab in planta screens. For the field trial, two different types of treatments were used against Xylaria: using selected single bacterial isolates and using cocktails of bacteria called synthetic communities (syncomm). The roots (Xylaria infected and non-infected) were collected and cleaned, the root yield was checked by measuring the root mass, and the root yields were compared among different treatments. The DNA from the root samples was isolated and sent to the CosmosID® for 16S rRNA sequencing and ITS. The MicrobiomeAnalyst and CosmodIDHub is used for raw sequence processing, statistical analysis, functional prediction, meta-analysis and integrative analysis of microbiome data.

This research illuminates the intricate interactions between soybean roots, their microbiota, and the TRD pathogen Xylaria, providing valuable insights for future disease management efforts.

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

Co-Advisor: Dr. George Popescu

Title: Validation of Positional Candidates Rps6ka6 and Pou3f4 for a Locus associated with Skeletal Muscle Mass Variability

Abstract: Genetic variability plays a crucial role in individual differences in skeletal muscle mass, but the specific genes involved remain unclear. This study investigated the role of two candidate genes, Rps6ka6 and Pou3f4, within a chromosome X locus linked to muscle mass variability in CFW mice. Histological analysis was conducted on hindlimb muscles of male CFW mice with either the muscle "increasing" allele C (n = 15) or "decreasing" allele T (n = 15) at the peak marker rs31308852, and on Pou3f4y/− mice compared to their wild-type littermates. To examine the role of Rps6ka6, exon 7 was deleted using CRISPR-Cas9 in H2Kb myogenic cells, generating a truncated RSK4 protein. We then evaluated the impact of this mutation on myoblast proliferation, migration, and differentiation.

Results showed that the extensor digitorum longus (EDL) muscle was 7% larger ($P < 0.0001$) in mice with the "increasing" allele, due to a 10% increase in muscle fiber number ($P = 0.0176$). In Pou3f4y/− mice, fiber number decreased by 15% in the slow-twitch soleus muscle ($P = 0.0268$) but not in the fast-twitch EDL ($P = 0.2947$). Rps6ka6-ΔE7 cells exhibited no differences in proliferation or migration, but differentiation indices (myosin expression, cell size, and fusion index) were significantly reduced ($P < 0.0001$). These findings suggest that the chromosome X locus influences fiber number in fast-twitch muscles via Rps6ka6, while Pou3f4 affects fiber number in slow-twitch muscles.

Presenter: Mohan Kumar Bista

Presentation Session: AO3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli, Rangappa, Assistant Research professor, Plant and Soil Sciences

Title: Physiological and morphological traits resilience of finger millet to drought Stress

Abstract: Finger millet (Eleusine coracana L.) is a small-seeded, short-day, warm season, C4 annual coarse cereal with several climate-resilient traits. This crop has been considered a potential alternative to traditional cereals, particularly for the marginal soil with frequent stresses. The studies on finger millet for hot and dry environments have been limited, and comprehensive research on resilience response is lacking. For the first time, we phenotyped 498 finger millet germplasm for pigments, key agronomic, and yield-related traits under hot and dry conditions in the marginal soil of Mississippi. In the Mississippi climate, over 71% of the accessions flowered and produced seeds. Further, we exposed four promising genotypes to drought stress for ten days during panicle development to gain a deeper understanding of physiological responses to drought. When subjected to drought, stomatal conductance (57%), transpiration (55%), electron transport rate (19%), and quantum efficiency of photosystem II (11%) were significantly reduced compared with control. These traits returned to near-control levels after rewatering, demonstrating the finger millet's rapid recovery potential. In addition, drought stress substantially decreased plant height (63%) and shoot dry mass (42%). While these reductions were partially recovered after rewatering, these traits (plant height to 25% and biomass to 32%) highlighted the growth and developmental traits' adaptability to challenging conditions. These findings suggest finger millet could be a valuable alternative to traditional cereals, particularly for rainfed regions. Combining tolerance and resilience physiological mechanisms with diverse adaptive plasticity might be crucial for developing drought-tolerant cultivars.

Presenter: Mohan Kumar Bista

Presentation Session: MP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Heat and drought stress: their combined impact on cotton physiology and agronomic performance

Abstract: The reproductive stage of cotton is highly sensitive to hot and dry environments. Individual effects of heat and drought stress on reproductive physiology have been well documented. However, the interactive effects of drought and heat stress on the physiological and agronomic traits of cotton have been overlooked. In this study, twelve genetically diverse upland cotton cultivars were grown in four distinct growing environments: control (CNT), drought stress (DS), heat stress (HS), and the combined drought and heat stress (DHS) during the flowering and boll development stages. Findings revealed that the impact of stressors on plant health and yield followed the order DS + HS > DS > HS. For instance, leaf temperature increased by 11 °C under DHS, followed by 9 °C under HS and 2 °C under DS compared with control-grown plants. Per °C increase in temperature decreased seed cotton yield by 12 % and 2 % with and without drought compared with CNT, respectively. Drought stress was more influential in reducing boll numbers with or without heat. Further, DS without heat reduced oil content by 10 %. Cultivars exhibited significant variations in physiology and agronomic traits under individual and combined stress. Cultivar PSC355 was identified as a combined stress-tolerant cultivar among the studied cultivars. Most agronomic and physiological traits displayed a weaker association between control and combined stress. Moreover, the combined stress effects on most traits were not simply the sum of individual stress effects. This study highlights the need to deal with combined stress tolerance separately from individual stress tolerance to sustain optimal seed cotton yield in hot, dry environments. Thus, breeding for improving combined drought and heat tolerance of cotton cultivars may need to focus on combined stress tolerance as a distinct task.

Presenter: Sabyasachi Biswas

Presentation Session: MP4

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Ali C. Gurbuz (Associate Professor, ECE)

Title: HRSpecNet: Deep Learning Based High-Resolution Time Frequency Analysis

Abstract: Micro-Doppler signatures are commonly used for human activity recognition (HAR) in radar systems, but traditional methods like the Short-Time Fourier Transform (STFT) face challenges such as a trade-off between time and frequency resolution, sensitivity to noise, and the need for parameter tuning. To overcome these issues, we propose a novel deep learning approach to reconstruct high-resolution micro-Doppler signatures directly from 1D complex time-domain signals. Our architecture includes an autoencoder to enhance the signal-to-noise ratio (SNR), an STFT block to learn frequency transformations for pseudo-spectrogram generation, and a UNET block to reconstruct high-resolution spectrograms. We evaluated this architecture on both synthetic and real-world data. Synthetic data involved generating 1D complex signals with multiple time-varying frequencies to assess the network's performance across various SNR levels. For real-world data, we used a challenging radar-based American Sign Language (ASL) dataset with 100 words to evaluate classification accuracy. Our approach demonstrated a 3.48% improvement in classification accuracy over traditional STFT-based methods. Both synthetic and experimental results show that our method generates higher-resolution, sparser spectrograms and enhances classification performance.

Presenter: Maria V. Bracamonte

Presentation Session: MP2

Level of Study: PhD

Department: Management

Category: Education, Arts and Sciences, and Business

Advisor: B. Parker Ellen III, Ph.D. (Dissertation Chair) Thomas B. and Terri I. Nusz Endowed Professor of Business Associate Professor of Management Associate Dean for Research and Executive Programs College of Business

Title: THE EFFECTS OF INDIVIDUAL POLITICAL REPUTATIONS ON PERCEIVER EMOTIONAL AND BEHAVIORAL REACTIONS: AN ATTRIBUTION THEORY PERSPECTIVE

Abstract: This dissertation explores how individual political reputations (IPR) in organizations influence the emotional and behavioral reactions of perceivers. Drawing on attribution theory, the study integrates the three core dimensions of attribution theory (locus of control, stability, and controllability) to propose a new framework that explains the processes through which political reputations are formed and their impact on workplace dynamics. I introduce the construct of IPR, defined as the subjective evaluation of an individual's political behaviors, classified along two axes: perceived beneficiary (self vs. others) and perceived behavioral characteristics (assertive vs. defensive). These axes yield four reputational categories: procurer, preserver, protector, and provider. Each category elicits different emotional and behavioral reactions from perceivers, ranging from cooperation to distrust, depending on how attributions are made. The model further suggests that the stability and locus of causality attributions moderate the strength of these emotional and behavioral responses. Contributions to both the politics and reputation literature are presented offering a comprehensive framework to understand how individual political behavior influences interpersonal relationships at work, with implications for leadership, team dynamics, and organizational culture.

Presenter: Brittany C Brown

Presentation Session: MP2

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Anna Osterholtz, Anthropology and Middle Eastern Cultures

Co-Advisor: James W Hardin, Anthropology and Middle Eastern Cultures

Title: Surviving Trauma: Exploring Mandibular Injury and Care in a Commingled Burial at Tell Abraq

Abstract: Here, we interpret the pathologies evident on the mandible of a deceased human individual from Umm an-Nar period Tell Abraq, within the Bioarchaeology of Care approach (BoC). The Umm an-Nar period spans roughly 2700 BCE to 2100 BCE in the Arabian Peninsula and is marked by distinct burial practices. An example of these practices is a tomb type characterized by a circular structure with two or more chambers and commingling burial practices. Within the tomb, one individual suffered trauma to their mandible and survived long enough for it to heal. This poster aims to follow the BoC and employing the Index of Care (IoC). I estimate that pathologies shown by this individual (e.g trauma to mandibular condyle, loss of all mandibular teeth, etc.) are indicative of possible physical impairment, such as possible partial facial paralysis. Integrating this finding within the mortuary processes of commingling can be challenging. This poster also aims to also discuss complications and limitations with applying the BoC approach to commingled individuals.

Presenter: Madeline Burdine

Presentation Session: AO5

Level of Study: PhD

Department: Social Science Research Center; Sociology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Kathleen Ragsdale, Research Professor, Social Science Research Center

Title: Can a Locally Source Dried Fish Powder Tackle Nutritional Gaps among Vulnerable Infants and Young Children in Zambia: Nutrient Analysis and Sensory Panel Results for Complementary Food for Africa+Dried Fish Powder (ComFA+Fish)

Abstract: Stunting among infants and young children (IYC) due to deficiencies in macronutrients (e.g., high-quality protein) and micronutrients (e.g., iron, zinc, vitamin A) is a major global health burden, particularly in low-and middle-income countries such as Zambia. Micronutrients are needed in small amounts, but deficiencies cause stunting and other serious health conditions. Deficiencies in high-quality protein negatively impact most bodily functions, including micronutrient absorption. Multiple micronutrient powders (MNP)—internationally regulated sachets of vitamins and minerals produced by a handful of global suppliers—have helped reduce global rates of stunting but have had less impact on protein malnutrition. Yet even when consumed in small quantities dried fish powder (DFP) made from small pelagic fish (~10 cm long) add high-quality and essential animal-sourced protein, fats, and vitamins. In order to promote DFP consumption among women of reproductive age (WRA) and IYC, we piloted a locally produced low-cost, high-quality protein/micronutrient blend, Complementary Food for Africa+Dried Fish Powder (ComFA+Fish), among 42 Zambian WRA (Sensory Panel I) and their 42 IYC (Sensory Panel II) to confirmed palatability of ComFA+Fish complementary porridge and other ComFA+Fish-fortified dishes. Next, we conducted a nutrient analysis of DFP made from Kapenta sourced from Zambia's Lake Kariba (see Table 1) and developed and piloted ComFA+Fish Plain Instant Porridge and ComFA+Fish Vanilla Instant Porridge among 40 WRA and other adults (Sensory Panel III). We present results of these research activities and how they inform our next set of DFP and ComFA+Fish activities.

Additional Information: Co-authors: Kathleen Ragsdale, Terezie Tolar-Peterson, Netsayi N. Mudege, Mary R. Read-Wahidi, Lizzy Muzungaire

Presenter: Miguel Cabrera

Presentation Session: MO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Virginia Montiel Palma, Department of Chemistry

Title: Nickel Complexes with Silyl-Phosphine and Silane-Phosphine Ligands as Dual Catalysts for the Selective Alkene Hydrosilylation and Aldehyde Hydroboration

Abstract: Within the hydroelementation processes involving silanes, we can mention both dehydrogenative and hydrogenative silylation that occurs across the alkene double bond. Alkenes hydrosilylation, as one of the significant variants of silane functionalization, can proceed through various reaction pathways, leading to both anti-Markovnikov, and Markovnikov. Achieving control over the regioselectivity of the reaction to direct toward a single product remains a current challenge.

In the quest for new catalysts based on non-precious metals in hydrosilylation and hydroboration reactions, significant achievements have been made. The development of catalytic systems based on Ni has gained considerable importance recently due to its ability to form highly reactive species during the reaction, favoring the insertion of silane/borane into the alkene.

Herein, we present a family of silyl and silane-phosphine nickel complexes. These complexes exhibit remarkable catalytic activity in both alkene and aldehyde hydrofunctionalization processes. Notably, we introduce a catalytic system that directs the selectivity of alkene hydrosilylation, favoring either Markovnikov or anti-Markovnikov isomers. Additionally, our research unveils a well-established system for the hydroboration of aldehydes, achieving remarkable results even with catalytic loadings as low as 0.01mol%. The hydrosilylation of terminal alkenes can lead to a diverse array of products, therefore, developing a selective catalytic system based on Ni is a significant achievement in this field. Remarkably, the reported complexes can be synthesized with ease using commercially available nickel(0) precursors.

Presenter: Bowen Cai

Presentation Session: MO8

Level of Study: PhD

Department: Advanced Composites Institute

Category: Engineering

Advisor: Dr. Wayne Huberty, Associate Director, Advanced Composites Institute

Title: Guided wave sensing based mechanical properties characterization for 3D printed thermoset composites

Abstract: Our study introduces an innovative approach for characterizing the mechanical properties of anisotropic thermoset composites fabricated through additive manufacturing. Traditional characterization methods often fall short in accurately evaluating thermoset materials due to their unique curing processes, microstructural variability, and anisotropic characteristics. To address these challenges, our approach leverages nondestructive guided wave sensing paired with an advanced optimization algorithm-assisted frequency-wavenumber analysis. The method utilizes a piezoelectric actuator to generate guided waves in a thermoset composites panel and a laser Doppler vibrometer on a 3D robotic stage to perform noncontact acquisition of wave signals across a two-dimensional grid, enabling the collection of comprehensive time-space wavefield data. Next, through a multidimensional Fourier transform and a novel fast dispersion curve regression technique driven by an optimization algorithm, our method can efficiently characterize the multi-directional mechanical properties of 3D printed thermoset composites. Proof-of-concept experiments were performed with a 300mm x 250mm x 8mm panel of 3D printed thermoset material reinforced with short carbon fiber. The results show that our system and method not only confirmed the ability to generate and capture guided waves across a wide frequency range but also successfully identified the multi-directional mechanical properties of the testing panel. The results underscore the potential of our approach as a noncontact, efficient means for the characterization and monitoring of composite materials during the additive manufacturing process. We expect this research to enhance a nondestructive and efficient method for characterizing multiple-type composites and monitoring their property changes during additive manufacturing.

Presenter: Alekhya Chakravaram

Presentation Session: MP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Drought and Warmer Nights Effects on Cowpea Physiology and Yield

Abstract: Cowpea is an important economic crop in many regions due to its high protein content, adaptability to different soil types, and growing conditions. Recent studies indicate an increased negative correlation between low rainfall events and crop production, including cowpeas. This effect is particularly pronounced during the reproductive and grain-filling phases, where drought stress (DS) can lead to decreased seed yield via low seed number per plant. On the other hand, historical weather data indicates a more rapid increase in high night temperatures (HNT) than daytime temperatures during the reproductive period. Studies have shown the negative impact of HNT on seed size and quality. This study examined the interactive effects of HNT and DS on physiological and yield attributes during the reproductive phase. Three diverse cowpea genotypes were grown under optimum conditions until flowering. Subsequently, they were subjected to four treatments: CNT group at 22°C with full irrigation, DS group at 22°C with 50% less irrigation, HNT group at 28°C, and DS+HNT group at 28°C with 50% less irrigation and a daytime temperature of 32°C. Results revealed that a 4.8℃ increase in nighttime temperatures and a 50% decrease in soil moisture led to significant reductions in stomatal conductance (91%) and transpiration (79%). Decreased stomatal conductance caused a 12.2oC rise in leaf temperature and a 64.5% reduction in pod weight under DS+HNT. The combined stresses had the most pronounced negative impact on seed yield, reducing it by 63.3%, followed by DS (30.53%) and HNT (22.3%) compared to the control. Seed protein content decreased the most under DS+HNT by 25%, while starch content increased by 11% compared to the control. Among the genotypes, "UCR 369" exhibited greater tolerance to stressors than the other genotypes. These findings emphasize the vulnerability of cowpeas to climate change and highlight the need for developing genotypes with improved resilience to HNT and drought. Further research is necessary to understand the underlying stress tolerance mechanisms and inform breeding strategies for sustainable cowpea production in changing environments.

Presenter: Nicole Colón-Bosques

Presentation Session: MP2

Level of Study: PhD

Department: Psychology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Kevin J. Armstrong, Associate Professor, Psychology

Title: Executive Functions as a mediator between ADHD symptoms and anxiety and depressive symptoms in emerging adults

Abstract: Attention-deficit/hyperactivity disorder (ADHD) is associated with comorbid disorders such as anxiety and depression in emerging adults (Prevatt et al., 2012; Mochrie et al., 2020). However, there is limited research examining this association. This study explored the potential mediating role of executive functions in the relationship between ADHD symptoms and anxiety and depressive symptoms, respectively.

A sample of 842 college students (mean age of 18.96 years) completed the Adult ADHD Self-Report Scale (ASRS-v1.1; Kessler et al., 2005), the Executive Function Index (EFI; Spinella, 2005), and the Depression Anxiety Stress Scale – 21 (DASS-21; Lovibond & Lovibond, 1995). The sample was selected from a Psychology Research Program (PRP) pool of a southern university and consisted of 630 women (74.8%), 197 men (23.4%), 13 non-binary (1.5%), and 2 preferred not to answer (0.2%).

PROCESS 4.2 (Hayes, 2022) model 4 was used with 5,000 bootstrap resamples to examine indirect effects. The confidence interval for the indirect effect of ADHD symptoms through executive function was significant for depressive symptoms, B = 0.85, SE = 0.20, 95% CI [0.48, 1.26], as well as anxiety symptoms, B = 1.36, SE = 0.23, 95% CI [0.94, 1.85].

ADHD symptoms in college students were associated with lower levels of depression and anxiety when students reported having stronger executive function skills. Given this association, future research could seek to clarify the role of executive functions in protecting individuals with ADHD from impairments associated with anxiety or depression and whether treatment that builds executive functioning skills is of value in clinical populations.

Presenter: Crystal Lodi Conde

Presentation Session: MO7

Level of Study: Master's

Department: Wildlife, Fisheries and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Dr. Fernando Yamamoto, Assistant Research Professor, Wildlife, Fisheries and Aquaculture

Co-Advisor: Dr. Peter J. Allen, Professor, Wildlife, Fisheries and Aquaculture

Title: EVALUATING THE PHYSIOLOGICAL RESPONSES WITH THE INCLUSION OF SOY LECITHIN, AND CATFISH OIL IN THE PRODUCTION PERFORMANCE OF CHANNEL CATFISH (Ictalurus punctatus)

Abstract: The effects of soy lecithin (SOL) and fish oil (FO) in place of soybean oil (SBO) in the diets of young channel catfish were analyzed by two feeding trials. In the first study, physiological reactions to air exposure stress and bacterial challenges were evaluated, besides the optimal SOL inclusion level. Over a period of 70 days, fish were fed with diets containing SOL at 0, 0.5, 1.0, 1.5, and 2%. The findings demonstrated that, in comparison to the control group, a 1.5% SOL diet resulted in greater weight increase and improved feed efficiency. The initial study revealed the best protein conversion efficiency was achieved with 0.5% SOL, even though no significant variations were observed in the whole-body proximate composition. The investigation of intestinal microbiota showed substantial variations in alpha diversity. Fish on a 2% SOL diet exhibited a greater hematocrit than those on a 1.0% SOL diet, according to blood samples obtained following acute air stress. A statistical study of blood data revealed that cortisol, glucose, lactate, and osmolality all varied significantly over time. Interestingly, there was a notable variance in cortisol levels according to time and diet treatment. Overall, the results indicates that 1.5% SOL supplementation can improve the growth performance of catfish. The diet containing SOL resulted in significant weight gain compared to the SBO diet, which also exhibited the lowest feed efficiency among the groups. Further, blood parameters and responses to bacterial challenges are currently under evaluation.

Presenter: Alexis Cutshall

Presentation Session: AO2

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Molly Zuckerman, professor, Anthropology and Middle Eastern Cultures

Co-Advisor: Anna Osterholtz, professor, Anthropology and Middle Eastern Cultures

Title: Community Engaged Archaeology at the Prospect Hill Plantation in Jefferson County, Mississippi

Abstract: Prospect Hill, a former plantation active throughout the early 19th century, was the home of Captain Isaac Ross, his family, and approximately 340 enslaved individuals. After Ross's death in 1836, his will directed the sale of the plantation and the relocation of the enslaved individuals to Greenville, Liberia. Today, the site is the focus of a multidisciplinary project that integrates archaeological excavations with the public so as to reveal insights into the daily lives of the enslaved. The project involves ethnographic interviews which explore cultural memory and mDNA analysis, used to trace a reverse African diaspora. This work not only explores historical narratives but also fosters a global connection and a deeper engagement with the descendants of the families at Prospect Hill.

Additional Information: This project is sponsored by Shawn Lambert, professor, Anthropology and Middle Eastern Cultures

Presenter: Alexis Cutshall

Presentation Session: MP2

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Molly Zuckerman, professor, Anthropology and Middle Eastern Cultures

Co-Advisor: Anna Osterholtz, professor, Anthropology and Middle Eastern Cultures.

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Additional Information: This project is sponsored by Shawn Lambert, professor, Anthropology and Middle Eastern Cultures

Presenter: Tobin J. Davidson

Presentation Session: AO4

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Michael W. Sandel, Assistant Professor, Wildlife, Fisheries, and Aquaculture and Forest and Wildlife Research Center

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 the native populations in the region. This study includes development of noninvasive environmental DNA (eDNA) protocols designed for early detection of invasive freshwater fishes, specifically Misgurnus 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. Thus, the deliverables of this study represent a rapid and cost-effective alternative to traditional sampling methods that allow an early detection and rapid response to the invasion of Misgurnus anguillicaudatus in the Cahaba River Watershed. 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: Arpita Deb

Presentation Session: MO5

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

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

Title: Investigating the effects of Aryl Hydrocarbon Receptor (AHR) ligands on Fcγ receptor 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 multiple sclerosis 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 previous studies have shown that the aryl hydrocarbon receptor (AHR) ligand 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) suppressed IgG1 antibody production in EAE. We next wanted to examine whether IgG1-mediated signaling was also compromised by AHR ligands. Therefore, we hypothesized that AHR ligand-mediated suppression of IgG1 antibody production would inhibit antibody-dependent immune responses in cells expressing Fcγ receptors. We first confirmed the expression of Fcγ receptors in innate cells. Next, we noted that IgG1 immune complexes were necessary to trigger an immune response through FcγRs, so we designed different approaches using trinitrophenyl-bovine serum albumin (TNP BSA)-TNP IgG1 or streptavidin-biotinylated IgG1 as immune complexes. Our results show that (TNP BSA)-TNP IgG1 and streptavidin-biotinylated IgG1 stimulated CD86 marker expression on F4/80+ macrophages. Additionally, ELISA analysis revealed that streptavidin-biotinylated IgG1 increased the release of IL-6 and TNFα cytokines, and C3a complement protein in splenocytes and RAW 264.7 cells. Blocking the Fcγ receptor-mediated activation of the ITAM modestly blocked IL-6 cytokine and C3a protein release in RAW cells. Next, cells were treated with AHR ligands to assess if the IgG1-triggered signaling was compromised. Our preliminary data from ELISA showed that the nontoxic AHR ligand, I3C, which is a natural dietary agonist, was successful in mitigating some of the immune responses. Further, our in vivo data from EAE showed that I3C suppressed MOG-specific (disease-specific) subtypes of IgG. Together our results provide evidence that the streptavidin-biotinylated IgG1 immune complex formation effectively triggered FcγR signaling to activate innate cells and nontoxic AHR ligand, I3C, might potentially suppress the immune response by suppressing the pathogenic antibody signaling.

Presenter: Prattay Dey

Presentation Session: MP3

Level of Study: PhD

Department: Biological Sciences

Category: Agriculture and Life Sciences

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

Title: Investigating Annexin A2 as a Common Receptor for Streptococcus pneumoniae on Human Epithelium

Abstract: Streptococcus pneumoniae (pneumococcus), is a gram-positive colonizer of the human nasopharynx, capable of causing both 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 that interact 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: Zach Dykema

Presentation Session: MO4

Level of Study: PhD

Department: Biological Sciences

Category: Education, Arts and Sciences, and Business

Title: Genetic impacts of serial bottlenecking in translocated populations of the Anegada rock iguana (Cyclura pinguis)

Abstract: Translocations play an important role in the conservation management of endangered species. Because translocated populations pass through artificial demographic bottlenecks, they can suffer from founder effects. This can increase frequencies of deleterious alleles at loci associated with the source population's genetic load. As a result, small populations in the early generations following translocation should experience elevated rates of inbreeding and inbreeding depression. Recently translocated populations of the critically endangered Anegada rock iguana (Cyclura pinguis) have been subjected to sequential bottleneck events. Though founding populations were extremely small (N=8 and N=4, respectively), the census sizes of translocated iguana populations increased exponentially. To quantify the genetic consequences of these bottlenecked populations, blood samples were collected from the source population (S) and the translocated populations (T1 and T2) and genotyped at 21 microsatellite loci. We found that allele frequencies in translocated populations differed significantly from those of the source population, with T1 and T2 having less genetic diversity. Multi-locus heterozygosity in hatchlings differed significantly across islands after bottlenecking, but not in adults. Our results provide clear evidence that inbreeding is elevated in the translocated populations, likely reflecting the small initial population sizes associated with these translocation events. This work serves as an anecdote for the consequences of poorly planned translocations, even when census sizes for breeding populations suggest they have been successful. Inbreeding depression should be avoided in translocations to ensure long-term population sustainability without human intervention.

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

Co-Advisor: Dr. Mark D. McConnell, Assistant Professor, Wildlife, Fisheries and Aquaculture

Title: Addressing Information Gaps in the U.S. Conservation Reserve Program: Exploring the Potential of the CRP Menu Tool to Enhance Landowner Decision Making

Abstract: The Conservation Reserve Program (CRP), the largest voluntary land-retirement initiative in the U.S., encompasses 29 million acres of agricultural land and provides annual payments to landowners who retire environmentally sensitive land for 10-15 years. Designed to enhance wildlife habitats, improve water quality, sequester carbon, and promote soil health, the program faces challenges despite increasing participation and rental payments. Persistent knowledge gaps and informational challenges create uncertainties in decision-making, often resulting in conservation practices that conflict with local ecological contexts and yield suboptimal outcomes. This study addresses these issues by examining existing knowledge gaps, identifying stakeholder expectations for a Decision Support Tool (DST), and developing the CRP Menu Tool to enhance informed decision-making. Using a mixed-methods approach, sample data were collected from 91 landowners and 145 practitioners through surveys and group discussions during 12 physical and 3 virtual workshops across Mississippi, Missouri, and Illinois. The findings revealed significant knowledge disparities between practitioners and landowners, emphasizing the need for improved educational resources and communication. Stakeholders expect a DST that facilitates the exploration of conservation practices, payment rates, enrollment updates, management requirements, and land eligibility assessments. The CRP Menu Tool, developed using open and classified USDA data, meets these expectations by offering a comprehensive platform for landowners to explore CRP opportunities. As a national tool, it is being refined and expanded in phases, starting with Mississippi, Missouri, Illinois, and moving to Indiana, Iowa, Ohio, Arkansas, and Louisiana, with plans for eventual nationwide implementation to better meet stakeholder needs.

Presenter: Daniel Egerson

Presentation Session: MO7

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

Category: Forest Resources and Veterinary Medicine

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

Title: Analyzing Perspectives on the Motivations and the Knowledge Gaps Impacting CRP Participation in the Midwest and Southern United States

Abstract: Motivations to participate in the Conservation Reserve Program (CRP) vary, but they are closely linked to the information available to landowners and their interactions with practitioners. This study explored landowner and practitioner perspectives on CRP participation and identified knowledge gaps influencing conservation outcomes. Data were gathered from 91 landowners and 145 USDA staff and technical service providers in Mississippi, Missouri, and Illinois through surveys and workshop-based focus group discussions. Key motivations included financial incentives, peer influence, soil conservation, water quality improvement, and wildlife benefits. However, many landowners struggled to distinguish between CRP practices and lacked knowledge of critical program details, such as signup periods. Likewise, only half of the practitioners felt confident in their understanding of program eligibility. Some landowners were unaware of available practices, while others found maintenance requirements too challenging. These findings highlight the importance of better engagement and clearer communication to enhance landowner participation and conservation outcomes.

Presenter: Pubuduni Ekanayaka

Presentation Session: MP1

Level of Study: PhD

Department: Physics and Astronomy

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Chuji Wang, Professor, Physics and Astronomy

Title: High-resolution electric field mapping in RF plasma using an optically trapped single particle.

Abstract: The electric field is a crucial plasma parameter, influencing charged particle behavior in RF plasmas and sheath dynamics. Langmuir probes are often used to measure it, but they can disturb the plasma by depleting energetic electrons or altering the discharge. A promising alternative is the use of micron-sized particles for plasma diagnostics. These particles, which become negatively charged in plasma, can be levitated by balancing their weight with the electric force. The electric field (E) can be determined by tracking their motion if the particle's charge (Q) is known.However, traditional methods limit particles to specific positions. Optically trapped particles, on the other hand, offer a non-invasive way to measure the electric field in three-dimensional plasmas. These particles can move freely without affecting the plasma. In this study, an optically trapped particle was used to map the electric field at the plasma sheath edge. Once released from the optical trap, the particle moves under gravity and the electric force, and its trajectory helps calculate the electric field, assuming Q remains constant. This method, used to measure field variations due to electrode changes, provides high-precision, non-intrusive measurements.

Presenter: Quazi Md Fazle Hasan Fahim

Presentation Session: AP1

Level of Study: Master's

Department: Landscape Architecture

Category: Agriculture and Life Sciences

Advisor: Dr. SaMin Han, Assistant Professor, Department of Landscape Architecture

Title: Vulnerability to resilience: shoreline typologies for climate change adaptation and thriving communities in Biloxi, Mississippi

Abstract: Historic infrastructures around Biloxi, MS, such as the Biloxi Lighthouse, sea wall, and Port of Gulfport, were developed based on the waterfront. Despite bringing prosperity, the shoreline has been most affected by devastating events like Hurricane Camille in 1965 and Hurricane Katrina in 2005. Today, Biloxi's coastline grapples with challenges from rising sea levels and more intense hurricanes, worsened by climate change. NOAA predicts a potential sea level rise of up to 2.1 meters (7 feet) by 2100, threatening vital infrastructure like the US 90 highway and sewer systems.

Field observations revealed a lack of public spaces along the shoreline with casinos and structures obstructing access, creating segregation from the local community. The lack of proper pollution treatment is also evident. Surveys measured public perceptions of vulnerability and desires for improvement.

This project proposes sustainable landscape-based solutions to address vulnerabilities while promoting wildlife habitats and community resilience. The shoreline is divided into four typologies based on edge condition and adjacent land use: (i)open spaces with sea walls, (ii)natural edges near commercial buildings, (iii)natural edge adjacent to roads, and (iv)sea walls flanked by buildings. Representative transects have been identified for each typology to explore and implement resilient strategies for a sustainable future and increased public usage. By tailoring strategies for each coastal condition from a pool of strategies utilized, the project aims to mitigate coastal flooding and hurricane damage, enhance public activities, and stimulate economic revitalization ensuring the longevity and resilience of Biloxi's shoreline community.

Presenter: Olufemi Farotimi

Presentation Session: MO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. A. Amanda

Title: How might HDX Improve Isomer Differentiation in the Mass Spectrometric Analysis of Metabolites?

Abstract: Mass spectrometry is routinely used for the analysis of metabolites from various biological specimens. While chromatographic separations and product ion dissociation patterns can improve specificity in some cases, mass spectrometry has a general limitation in differentiating isomers due to their shared intact mass-to-charge ratios. Translating experimental data to a chemical structure is often a bottleneck and many “features” may not be readily assigned to a specific, single metabolite. For known metabolites, as collated in the Human Metabolome Database (HMDB), a given m/z often corresponds to numerous isomers and isobars; thus, additional structure-sensitive dimensions of analysis could be useful. Hydrogen /deuterium exchange (HDX) is at certain functional groups such as -OH, -SH, -COOH, and -NH, thus it provides additional structural insights. Previous studies have proposed different isotopic labeling methods for isomer differentiation via in-source kinetic HDX or gas-phase HDX. These experiments often allow for successful isomer differentiation and is useful in comparing to synthetic standards, however due to the complex dynamics of the source region, modeling this approach for in silico predictions is a challenge. In this study, we performed a literature survey to establish rules for identifying labile hydrogens and then applied these rules to assign theoretical numbers of exchangeable protons to six model compounds (and their respective isobars within the HMDB) and three entire biospecimen sets within the HMDB. From this data we could extract the extent to which HDX improves isobar selectivity over mass alone

Presenter: Khadija Ferdous

Presentation Session: AP2

Level of Study: PhD

Department: Clinical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Cooper Brookshire, Assistant Clinical Professor, Department of Clinical Sciences

Co-Advisor: Dr. Keun Seok Seo, Associate Professor, Department of Comparative Biomedical Sciences

Title: Comprehensive analysis of genotype and phenotype of veterinary Enterobacterales isolates for cephalosporin antibiotics

Abstract: Comprehensive analysis of genotype and phenotype of veterinary Enterobacterales isolates for cephalosporin antibiotics

Khadija Ferdous1, Rachel Strom1, Maclin Miller1, Joo Youn Park2, Keun Seok Seo2, Cooper Brookshire1

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Extended Spectrum Beta-Lactamase (ESBL)-producing bacteria pose a significant global health threat, particularly in veterinary settings. This study investigates the genetic determinants of antibiotic resistance in 107 Enterobacterales isolates from veterinary sources, archived from 2020 to 2024 by the MSU-CVM diagnostic laboratory. The isolates, primarily from canine (104) and feline (3) patients, were derived from urine (73) and soft tissue (34) infections, with the predominant species being E. coli (66) and Klebsiella spp. (41). Multiplex PCR was employed for genotyping, while antibiotic resistance phenotyping was performed using a modified Kirby-Bauer method. Isolates were classified as non-ESBL (35), AmpC ESBL (19), non-AmpC ESBL (50), or carbapenem-resistant Enterobacterales (CRE, 3). Among the 72 resistant isolates, 90% carried at least one ESBL gene, with detection rates of 61% for blaTEM, 43% for blaSHV, 53% for blaOXA-1, 57% for blaCTX1, and 25% for blaCIT. In contrast, 23% of non-ESBL isolates possessed an ESBL gene, predominantly blaTEM (14%) and blaCIT (9%). Notably, the blaCIT gene was present in 82% of AmpC phenotype isolates, suggesting a potential link between phenotypes. These findings underscore the complexity of resistance mechanisms and will inform the development of targeted treatment strategies and rapid diagnostic tools for antibiotic resistance in veterinary medicine.

Presenter: Yasas Gamagedara

Presentation Session: MO3

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Agriculture and Life Sciences

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

Co-Advisor: Dr. Mary L. Tagert, Assistant Extension Professor, Agricultural and Biological Engineering, Dr. Vitor S. Martins, Assistant Professor, Agricultural and Biological Engineering, Dr. Gary Feng, Research Soil Scientist, USDA - Agricultural Research Service

Title: Harmonizing Spectral Data Between Fourier Transform Infrared Spectrometers to Accurately Predict Soil Carbon

Abstract: Mid-infrared reflectance spectroscopy is a promising, rapid technology for accurately predicting soil properties from a single scan. Leveraging the United States Department of Agriculture – Kellogg Soil Survey Laboratory's (KSSL) MIR spectral library (n > 70,000) to predict new soil samples can greatly reduce the cost and time involved in soil analysis. Further, evaluating the predictive capabilities of various spectrometers is essential due to their versatility and cost-saving potential. The objectives of this study were to compare prediction performances of soil carbon (i) between KSSL and local spectrometers and (ii) between local spectrometers. The Vertex-70 (VT) spectrometer from KSSL, along with two local spectrometers: Alpha II equipped with DRIFT (DR) and Front Reflection (FR) modules, and the ARCoptix (ARC) were used. KSSL spectra were harmonized using first derivative and detrending pre-processing techniques. A total of 35,477 samples were selected from KSSL using the nearest neighbor method, while the local dataset included 1,571 soil samples from Mississippi and Texas. Principal component analysis revealed significant spectral deviations between spectrometers. R^2 values for KSSL to local transfers were 0.80 for VT-DR, and 0.79 for VT-FR. Local to local transfers resulted in R^2 values of 0.91 for FR-DR, 0.87 for DR-FR, and 0.68 for FR-ARC. Transfers between VT, DR, and FR showed acceptable performance for soil carbon predictions, but the VT-ARC, and DR-ARC transfers completely failed. Future research will explore calibration transfer techniques to improve the use of cheaper portable spectrometers like ARC, further reducing costs and time.

Presenter: Fernanda Garcia

Presentation Session: AO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sidney Creutz, Professor, Chemistry

Title: Oxidation of Non-Activated Alkenes with a Pentadentate Manganese Complex and Mild Oxidants

Abstract: Some of the most important starting materials in synthesis are ketones and aldehydes. These are commonly synthesized from oxidation of primary and secondary alcohols, and alkenes, or reduction of esters, amides, and carboxylic acids. Selective conditions that mildly oxidize alkenes are very sought after in synthetic chemistry. Manganese has been studied for its reactivity in mild conditions in enzymatic processes and some reported oxidation reactions. Additionally, manganese is a cheap and abundant metal. In this context, the oxidation of activated alkenes with manganese complexes has been reported in good to excellent yields. However, the oxidation of non-activated alkenes has remained limited and relatively unexplored. In our work, the manganese complexes [MnIITipMeOTf]OTf and [MnII(H2O)(TipMe)(MeCN)][ClO4]2 were synthesized from MnOTf2 and Mn(ClO4)2, respectively. The complexes were characterized structurally by exact mass determination with mass spectrometry, and by XRD. Oxidation of terminal, cis- and trans-alkenes has yielded traces of the aldehyde product, with the corresponding epoxide as the major product. These results suggested that the reaction conditions can be optimized to obtain a higher yield of the alkene cleavage product, the carbonyl product, over the epoxidation of the substrates. The solvent, additive, oxidant and the complex can be modified to find the best conditions for the alkene cleavage pathway.

Presenter: Hari Giri

Presentation Session: AO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Colleen Scott, Associate Professor , Chemistry

Title: Uniaxial and coaxial electro-spun micro/nanofibers from phenothiazine-derived polyaniline

Abstract: Employing creative synthesis methods and advanced material systems is necessary to create versatile fibers for flexible electronic and wearable smart textile applications. Electrospinning is a concise, cost-effective, accurate, versatile, and efficient method for large-scale fiber production with tailored properties for application. Electro-spun nanofiber networks possess remarkable adaptability and tunability, rendering them very promising materials for various applications such as tissue engineering, chemical sensors, and electronics applications. This method uses electrostatic forces to create 1D polymer nano/microfibers with precise diameters ranging from tens of nanometers to micrometers. The objective is to optimize the electrospinning parameters to obtain a uniform fiber morphology and enhance properties. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) investigations confirmed the fibers' homogeneity and nanostructure. Additionally, electrical conductivity was determined by custom-made to get a more precise idea emphasizing their conductivity. The electrical performance tests demonstrated that the coaxial fibers maintain a high level of conductivity while also displaying enhanced mechanical robustness compared to the uniaxial counterparts. This study showcases the viability of using coaxial electro-spun PANI derivative fibers in smart textiles, wearable electronics, and responsive fabric systems.

Presenter: Kaitlyn Gordon

Presentation Session: MO6

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Agriculture and Life Sciences

Advisor: Dr. Mary Love Tagert, Agricultural and Biological Engineering

Title: Geospatial Analysis of Biomass Supply and Energy Need to Increase Resiliency in Rural Mississippi

Abstract: Many rural areas of Mississippi experience energy deficiencies that can hinder local productivity. Therefore, there is a need to provide these areas with alternative energy generation methods to bridge the gap. This research examines a leading solution for improving resiliency in these areas. Rural areas with unreliable energy supplies are often co-located in areas of concentrated agricultural production, which could make biomass fueled combined heat and power (bCHP) systems a good option for supplying additional energy and increasing resilience in these areas. Different forms of biomass can be burned in a boiler to create high-pressure steam which will turn a turbine to produce electricity. Geospatial data for different commodities and types of biomass are being combined and analyzed with data showing energy deficient areas of the state, which will help determine the most optimal locations for bCHP systems in the state of Mississippi. Results from this analysis also allows for the creation of a decision-making tool to be used by local municipalities and city officials when considering alternative energy sources. Selection of optimal areas for bCHP implementation will be based on the geological distance of readily available biomass and industrial presence in the surrounding area, and identification of sites with readily available biomass will help reduce costs associated with storage and transportation. Esri's ArcGIS software is used to determine locations of interest for placement of bCHP systems to increase energy security and enhance reliability in areas of need throughout the state.

Presenter: Sijin Guo

Presentation Session: MP1

Level of Study: PhD

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Jilei Zhang, Professor, Sustainable Bioproducts

Title: Optimizing Copper Loading for Enhanced Dispersion of Graphene-Encapsulated Cu^0 Nanoparticles Synthesized from Kraft Lignin

Abstract: We previously proposed a thermal method for producing graphene-encapsulated Fe0 nanoparticles using Kraft lignin, a naturally abundant and renewable biopolymer, with metallic salts serving as catalysts for lignin-graphene (LG) production with multi-layers. The yield and quality of graphene are strongly linked to the dispersion of metal nanoparticles within the lignin matrix. In this study, we explored using of Copper (Cu), which has lower carbon solubility, as an alternative catalyst source for producing graphene-encapsulated Cu^0 nanoparticles, we investigated the effects of varying copper loading (10% to 40%) on the dispersion of copper nanoparticles within the lignin matrix to optimize conditions for graphene synthesis. Fourier-transform infrared spectroscopy (FTIR) results indicated that a Cu loading of 20% yielded the strongest interactions between copper ions and lignin functional groups. Following the thermal process, transmission electron microscopy (TEM) images confirmed excellent dispersion of Cu nanoparticles at this loading. Additionally, X-ray diffraction (XRD) analysis was conducted to assess the impact of copper loading on phase distribution. Our preliminary findings underscore the critical role of copper loading in modulating nanoparticle dispersion. This work demonstrates that optimizing Cu loading not only enhances graphene formation quality but also provides valuable insights into the mechanisms behind the synthesis of graphene-encapsulated metal nanoparticles, paving the way for sustainable applications in advanced materials.

Presenter: Vijaykumar Hosahalli

Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Chilling Tolerance of Diverse Soybean Genotypes during Seedling Emergence

Abstract: Soybean yields are greatly affected by moisture and temperature stress during the growing season. Historical data shows that soybeans in the US Midsouth, including Mississippi, are often exposed to unfavorable conditions, resulting in significant yield losses. Therefore, adopting an early-season planting approach similar to corn (Zea mays) could offer an opportunity to escape some drought and heat stress damages during the flowering and seed-filling period and efficiently utilize late spring and early summer rainfall for soybean growth and development. Soybean requires average soil temperatures above 15°C for uniform seedling emergence percentage and post-emergence seedling vigor. No systematic studies have explored the genetic potential of soybean cultivar responses to chilling tolerance. To address this knowledge gap, seventeen high-yielding soybean genotypes from different industries were tested for chilling (15°C) tolerance using an incubator, growth chamber, and field-like conditions. Under chilling conditions, the average germination percentage for soybean genotypes was reduced, and time to 50% germination or emergence was delayed compared to the optimum temperature (25°C). Furthermore, significant differences in the levels were noted for photosynthetic pigments among the soybean under chilling. Our findings suggest that the soybean genotypes exhibit varied responses to chilling stress, with some genotypes displaying higher seedling vigor under chilling conditions. Based on three different experiments, chilling-tolerant genotypes with greater germination or emergence and high vigor were identified. Findings indicate significant genetic variability in chilling stress and could be explored for breeding tolerant genotypes.

Presenter: Jing Huang

Presentation Session: AP1

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Dr. Fernando Y. Yamamoto, Assistant Research Professor, Thad Cochran National Warmwater Aquaculture Center, Department of Wildlife, Fisheries, and Aquaculture

Co-Advisor: Dr. Heather R. Jordan, Professor, Department of Biological Sciences

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

Abstract: Catfish is one of the most important freshwater fish farmed in the US. To maximize production efficiency and reduce costs, affordable alternative ingredients are needed. In this study, commercial animal by-products and soybean meal were tested as affordable and sustainable protein ingredients replacing fishmeal in catfish fingerling feeds during a 70-day feeding trial. In total, five dietary treatments [soybean meal (SBM), fishmeal (FM), animal protein concentrates A and B (APC-A/B), and poultry by-product meal (PBM)] were randomly distributed into 25 tanks (30 fish/tank, initial weight=15.3g) operating as a recirculating aquaculture system. The growth performance and water quality were recorded throughout the feeding trial. Fish fed SBM diets demonstrated a significantly lower growth performance compared to the other groups, and the intraperitoneal fat ratio and viscerosomatic index increased compared to APC-B. Intestinal microbiota presented a higher relative abundance of Pediococcus and Oscillospirales in fish fed the PBM and APC-A diets, respectively. A catfish bacterial pathogen, Edwardsiella icturari, was cultured to challenge the remaining fish and assess whether dietary treatments compromised their disease resistance. The PBM had a significantly higher survival after the infection when compared to SBM. In conclusion, PBM demonstrated to be a good alternative ingredient in the catfish diet, which could be inexpensive when compared to FM, without presenting any deleterious effects. On the other hand, fish fed SBM diets presented an increase in visceral fat, reduced growth performance, and increased disease resistance, which are undesirable responses for a sustainable aquaculture production.

Presenter: Jing Huang

Presentation Session: MO7

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Dr. Fernando Y. Yamamoto, Assistant Research Professor, Wildlife, Fisheries and Aquaculture

Co-Advisor: Dr. Heather R. Jordan, Professor, Department of Biological Sciences

Title: Autochthonous Probiotics, Lactococcus lactis Isolate MA5, From Hybrid Catfish (Ictalurus punctatus × I. furcatus) Improve in Acute Hypoxia Stress Recovery

Abstract: With the recent intensive production in the catfish industry, fish have become more susceptible to hypoxia stress, which can compromise growth performance and disease resistance. Dietary probiotics have shown the ability to regulate stress responses and promote growth and immune modulation. In this study, an autochthonous probiotic, Lactococcus lactis MA5, originally isolated from hybrid catfish was evaluated as a dietary supplement in a 56-day feeding trial. In total, three dietary treatments (Control, 104, and 106 CFU/g of lyophilized MA5) were randomly assigned into 18 tanks (n=6; 25 fish/tank; initial weight 16.4 g) in a flow-through system. The probiotic was coated on a commercial feed with oil and at the end of the feeding trial, production performance was measured. A significant increase in body weight was observed for fish in 106 CFU/g group compared to the control. Upregulation of the GPx1, iNOS mRNA expression level in the intestine was observed in fish treated with MA5. In addition, after the feeding trial, 10 fish/groups were subjected to an acute hypoxia challenge, to investigate the potential stress regulation of probiotic. The fish fed with MA5 displayed an increase in serum glucose, protein and cortisol, and their blood had higher red blood cells and hemoglobin when compared to the control group. The remaining fish were subjected to exposed to Edwardsiella ictaluri, and survivability was promoted by the 106 CFU/g treatment. In conclusion, MA5 dietary supplementation can regulate stress responses when exposed to acute hypoxia stress and increase disease resistance.

Presenter: Patricia Marie Cordero-Irizarry

Presentation Session: MO3

Level of Study: PhD

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Donna Peterson, School of Human Sciences

Title: From Bricks to Soil: Developing the 4-H LEGO® Club Soil Curriculum

Abstract: The Mississippi 4-H LEGO® Club aims to promote science, technology, engineering, and mathematics (STEM) at an introductory level for elementary students. However, STEM education curricula often fail to incorporate soil science topics despite soil's critical role in supporting agricultural and ecological systems, encouraging environmental responsibility, and sustaining life. Soil education is vital for children because it fosters a sense of connection to nature and promotes sustainable practices from an early age. Therefore, the 4-H LEGO® Club: Dig into Soil curriculum was created to address this need. Using the experiential learning model, the curriculum integrates hands-on LEGO® activities, group discussions, literature, and arts across six lessons that cover basic soil science concepts such as soil texture, soil erosion, soil profile, soil biology, and soil conservation. Unique features of the curriculum include the use of LEGO® bricks to model soil concepts and interactive group activities that foster both individual and collaborative learning experiences. The curriculum bridges the gap between theoretical knowledge and practical application by incorporating real-world examples that children can easily relate to. Assessment methods include an evaluation sheet to identify changes in children's social, psychomotor, and emotional skills, as well as their interests in STEM and agricultural literacy. Following its initial launch, the curriculum will undergo a pilot phase where extension agents and 4-H Cloverbud leaders will collect detailed feedback to refine the program and expand its reach. Subsequent versions aim to enhance learning outcomes by integrating digital tools and expanding to various educational environments.

Presenter: Md Nurul Islam

Presentation Session: AO2

Level of Study: PhD

Department: Finance and Economics

Category: Education, Arts and Sciences, and Business

Advisor: Brandon N. Cline, Professor, Department of Finance and Economics

Title: Politician Personal Misconduct and Congressional Insider Trading

Abstract: This paper examines the relationship between unethical behavior in politicians' personal lives and their financial conduct, especially in insider trading. We examine whether politicians involved in personal misconduct or indiscretion are more likely to exploit inside information for personal financial gain. Using hand-collected data on the U.S. Senators' personal misconduct and financial disclosure from 2012 to 2022, we find empirical evidence that personal misconduct significantly influences insider trading profits. Our analysis reveals that politicians involved in personal indiscretion achieve significantly higher profitability from their trades than those without such indiscretions. Specifically, within a 30-day window surrounding each purchase trade, politicians involved in indiscretion realize an average cumulative abnormal return (CAR) that is 1.01% higher than politicians without such indiscretions. Findings also suggest politicians can avoid losses by selling stocks before price declines. Our findings remain robust across various abnormal return measures, event windows, and politician- and firm-level controls relevant to insider trading returns. Additionally, our results indicate that politicians involved in personal indiscretions are more prone to violating the STOCK Act.

Presenter: Md Nurul Islam

Presentation Session: AO5

Level of Study: PhD

Department: Finance and Economics

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Brandon Cline, Professor, Department of Finance and Economics

Title: Decoding Noncompliance: Are Politicians' Delinquent Financial Disclosures Informative?

Abstract: This paper examines whether U.S. politicians intentionally violate the reporting requirements mandated in the STOCK Act of 2012 to conceal and profit from private information. Our analysis of financial disclosure data reveals compelling evidence of deliberate violations among politicians, with 41.08% of trades filed after the required 45-day deadline. Notably, these violations are evident across all political affiliations. Moreover, politicians tend to earn significantly higher abnormal returns in purchase trades that violate reporting deadlines while minimizing losses in sell trades. Specifically, purchase trades violating the reporting deadlines yield 0.27% higher returns over a 10-day period following the trades, while sell trades violating the deadline yield 0.32% lower returns than non-violations. These differences are both statistically and economically significant. We observe similar trends over 15-day and 30-day periods. Additionally, our study suggests that the effect of politicians filing violations on abnormal returns is more pronounced for small firm stocks than large firm stocks, indicating a strategic targeting of smaller firm stocks to exploit private information. Overall, our findings underscore the ethical concerns surrounding conflicts of interest among politicians and the need for stricter enforcement of reporting requirements to combat congressional insider trading and enhance transparency and fairness within financial markets.

Presenter: Mohammad Shakiul Islam

Presentation Session: AO5

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

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

Title: Spatiotemporal Dynamics of Cyanobacterial Blooms: Integrating Machine Learning and Feature Selection Techniques with Uncrewed Aircraft Systems and Autonomous Surface Vessel Data

Abstract: Phycocyanin (PC) pigment is unique to cyanobacteria. Thus, measuring PC facilitates the monitoring of cyanobacterial blooms in aquatic environments. This paper evaluated ten machine learning algorithms (MLAs) for obtaining spatiotemporal variations of PC concentrations over the largest reef complex of the Western Mississippi Sound (WMS) using remotely sensed imagery from uncrewed aircraft systems and in-situ PC concentrations measured by an autonomous surface vessel. Subsequently, the influence of river discharge and climatic variables on cyanobacterial concentrations were investigated by using a time-series of cyanobacteria maps. To derive the best PC retrieval model, a comprehensive list of 85 features was initially generated, including individual spectral bands, their band ratios, several vegetation indices, and three-band indices. To select the best feature subset for each MLA, the study adopted a combined approach utilizing two innovative feature selection techniques: Sequential Backward Floating Selection (SBFS) and Exhaustive Feature Selection (EFS). SBFS was employed initially to iteratively remove features to optimize model performance. Subsequently, EFS evaluated all combinations of features suggested by SBFS and selected the best subset. Among the ten MLAs, Extreme Gradient Boosting performed the best (R2 = 0.835, root mean square deviation = 0.419 µg/l, unbiased mean absolute relative difference = 0.176 µg/l, and average percentage difference = 18.072%) in retrieving PC concentration. The time-series analysis revealed significant variations in cyanobacterial concentration in WMS from 2018 to 2022. The highest average concentration was observed in 2019, attributed to the introduction of diverted Mississippi river water through the Bonnet Carre Spillway, leading to an unprecedented cyanobacterial bloom. Additionally, the average PC concentration was consistently higher in summer than any other time of the year, likely due to elevated air temperatures and ample sunshine promoting cyanobacterial growth. The method formulated in this study enhances quantitative monitoring of cyanobacterial blooms in coastal waters such as WMS and provides valuable insights for future water quality monitoring initiatives in other regions.

Presenter: Kevin Jones

Presentation Session: MP1

Level of Study: Master's

Department: Wildlife, Fisheries and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. J. Wesley Neal, Extension/Research Professor, Wildlife, Fisheries & Aquaculture

Title: eDNA detection of Walleye in eastern Mississippi streams

Abstract: The Gulf Coast strain of Walleye (Sander vitreus) is a genetically isolated population endemic to the Mobile River Basin in Mississippi and Alabama. This strain is threatened by habitat loss, poor water quality, and introgression with introduced northern Walleye. The population in the upper Tombigbee River has been especially impacted by the construction of the Tennessee-Tombigbee Waterway (TTW). This population is now supplemented with hatchery-produced Gulf Coast Walleye, but the efficacy of stocking efforts and the status of the remaining wild population are poorly understood due to the difficulty of sampling these fish using traditional gears. This study will use eDNA to detect Walleye in tributaries of the upper Tombigbee River which may serve as spawning areas. In spring 2024, water filter samples and habitat data were collected from 26 streams. These filters will be analyzed for Walleye DNA using a single-species qPCR assay, which is currently in development. We hope to inform future conservation efforts for this imperiled population by better understanding its status and distribution. As lab analyses are still ongoing, this presentation will cover preliminary results as well as the background and methods of our survey.

Presenter: Himani Joshi

Presentation Session: AP1

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Peixin Fan, Assistant Professor, Department of Animal and Dairy Sciences

Co-Advisor: Dr. Caleb Lemley, Professor, Department of Animal and Dairy Sciences; Dr. Amelia Woolums, Professor, College of Veterinary Sciences; Dr. James Brett, Professor, College of Veterinary Sciences

Title: Development of a Menthol-Based Heat Stress Mitigation Strategy via Vagus Nerve Stimulation in Dairy Cattle

Abstract: Heat stress negatively affects milk production, reproductive efficiency, and wellbeing of dairy cattle. This pilot study was aimed to assess whether topical application of menthol, a specific agonist of cold receptor TRPM8, around auricular vagal region could alleviate heat stress through stimulating the Vagus nerve. Twelve lactating Holsteins were divided into three groups: negative control (NC, n=3), plain wax (PW, n=3), and menthol wax (MW, n=6) and kept in the heat stress condition for 14 days. The PW and MW groups were topically applied with menthol wax and olive-oil based plain wax during morning and afternoon feedings from day 0 to 14, respectively. As results, MW group exhibited significantly higher daily feed intake compared to the combined NC and PW groups (51.64 ± 5.81 kg/cow vs 46.03 ± 7.49 kg/cow, P=0.03). The respiratory rate measured 1 hour after afternoon application of the MW group (82 ± 8.07 breath/min) was significantly lower than NC group (P=0.02, 90.22 ± 10.67 breath/min), but showed no difference with PW group (P =0.16, 85.11 ± 9.73 breath/min). Heat shock protein 70 levels decreased more in the menthol group (0.35%) compared to the plain (0.32%) and control groups (0.28%), though not statistically significant (P=0.62). However, no significant differences in the rectal temperature (P=0.43) and milk yield (P= 0.31) were observed between three groups. These findings suggest that topical menthol application has potential to alleviate heat stress in dairy cows, but further analysis is needed to explore its broader physiological effects.

Presenter: Himani Joshi

Presentation Session: MO7

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Peixin Fan, Assistant Professor, Department of Animal and Dairy Sciences

Co-Advisor: Dr. Caleb Lemley, Professor, Department of Animal and Dairy Sciences; Dr. Brian Rude, Professor, Department of Animal and Dairy Sciences

Title: In vitro Assessment of the Neuroactive Potential of the Rumen Microbiome

Abstract: The gut microbiome harbors commensal microbes like Bacteroides and Lactobacillus that can synthesize neuroactive compounds such as neurotransmitters. These neurotransmitters can modulate stress responses through a bidirectional communication called gut-brain axis. However, the neuroactive potential of rumen microbiota in regulating such responses remained significantly underexplored. This study aimed to investigate whether rumen microbiota can synthesize neuroactive compounds. We collected rumen fluid from beef cattle, anaerobically incubated in-vitro for 48 hours and analyzed the neurotransmitters and their precursors using Liquid Chromatography Mass Spectrometry (LCMS) analysis. LCMS detected neurotransmitters acetylcholine, gamma-aminobutyric acid (GABA), glutamate, and precursors 3,4-dihydroxyphenylacetic acid (DOPAC), tryptophan, and tryptamine A, with varying concentrations across different time points. Notably, GABA concentration tended to increase from 0h to 24h (425.7 ± 55.6 ng/mL vs 943.4 ± 75.16 ng/mL, P = 0.058) and tended to decrease to 496.7 ± 125.7 ng/mL at 48h (P=0.07) potentially indicating a reduction in microbial viability. Similar pattern was observed in glutamate concentration (0h: 38,348.3 ± 10,289.47 ng/mL; 24h: 55,850.4 ± 8,307.96 ng/mL; 48h: 38,781.3 ± 2,638.71 ng/mL), though this trend was not statistically significant (P = 0.83). Concentrations of acetylcholine (P = 0.08), tryptophan (P = 0.41), DOPAC (P=0.7), and tryptamine A (P = 0.69) fluctuated between 0 to 24h with non-significant trends. The results showed that rumen microbes can synthesize neuroactive compounds, particularly GABA and glutamate. These findings indicate that microbial activity in the rumen may influence host neuroactive and neurological functions, warranting further exploration of the rumen-microbiome-brain axis.

Presenter: Samuel Juarez

Presentation Session: AO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. T. Keith Hollis, Professor, Chemistry

Title: Synthesis and Characterization of (CCC-NHC) Mo Pincer Complexes and Non-Pincer Binding Modes

Abstract: The reduction of dinitrogen to ammonia is a chemical process used worldwide in the production of fertilizers. Its large scale implementation as the Haber-Bosch process (HBP) now sustains the world population. In the USA, the 88% of the ammonia is used for fertilizers, while the rest is used for commodity chemicals. The HBP uses up to 2% of the global annual energy in the steam reformation of hydrogen (H2) and its high pressures and temperatures. Furthermore, the steam reformation process releases the equivalent of 188 million tons of CO2 per year. Recent advances in the field have led to an interest in well-defined catalysts that can reduce the energy requirements of the HBP, and replace the use of H2 for acids or even water. Pincer metal complexes have shown to be promising candidates for these catalysts. Among these complexes, those with a CCC-NHC pincer ligand are expected to make the metal bind N2 due to the strongly electron-donating nature of the ligand. In this work, new CCC-NHC metal complexes will be synthesized and characterized for their catalytic activity in dinitrogen reduction. The optimization of the catalytic conditions will help to eventually remove the high energetic costs of the HBP.

Presenter: Vaishali Kshirsagar

Presentation Session: MO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr Sidney Creutz

Title: Colloidal synthesis of Se alloyed BaZrS3 perovskites

Abstract: The decreased toxicity and greater stability of chalcogenide perovskites like BaZrS3 and its associated alloys, make them a possible substitute for lead halide perovskites in optoelectronic applications. The alloys of BaZrS3 with selenium (BaZrS3-xSex) are new types of semiconductor and are potential absorbers in solar panels and photodetectors. The solid-state synthesis of bulk BaZrS3-xSex is reported in the literature however, the synthesis requires extremely high temperatures and is therefore incompatible with most thin-film fabrication methods. In the present work, we demonstrate the solution-phase synthesis of colloidally stable selenium-alloyed BaZrS3 nanocrystals suitable for thin film technological applications. Our method allowed the synthesis of BaZrS3-xSex nanocrystals at relatively lower temperatures (365 oC), using trioctylphosphine selenide as the selenium source. Importantly, our approach results in high colloidal stability without change in the distorted orthorhombic phase of the host even after 80% of Se alloying into the anion site. We believe our methodology will pave the way for the colloidal synthesis of BaZrS3-xSex, a material that is otherwise challenging to explore in thin-film technological applications.

Presenter: Will Laird

Presentation Session: MP2

Level of Study: Master's

Department: Geoscience

Category: Education, Arts and Sciences, and Business

Advisor: Rinat Gabitov, Professor, Geoscience

Title: An Apatite for Iodine

Abstract: Iodine-129 has a high radiotoxicity even at low concentrations and a long half-life (15.7 million of years), which corroborates the importance of immobilization of this nuclide [1]. Deep geologic storage is the most likely solution for isolation of spent nuclear fuel (SNF) for preventing environmental contamination. Bentonite, a material proposed for development of engineering barriers, absorbs various cationic nuclides but is not as effective for common 129I anions (iodide and iodate).

Our experiments showed that apatite entraps up to a few wt.% of iodate from aqueous solutions at ambient and hydrothermal conditions. The degree of this entrapment was found to increase by over an order of magnitude with decreasing the iodate concentration in the fluid from 1270 ppm to 32 ppm, which corroborates an importance of apatite in immobilization of 129I. We crystallized apatite in iodine bearing solutions at temperatures ranging from 40˚C to 200˚C, which are expected at disposal sites in the proximity and at the distance from SNF canister. Experimental products (crystals and fluids) were characterized with a variety of spectroscopy and mass spectrometry techniques for quantifying iodine uptake as well as characterizing its positioning within apatite structure.

References:

[1] Kaplan, D I et al. “Radioiodine Biogeochemistry and Prevalence in Groundwater.” Critical reviews in environmental science and technology vol. 44,20 (2014): 2287-2335.doi:10.1080/10643389.2013.828273

Presenter: Abigael Nasimiyu Laisa

Presentation Session: AP2

Level of Study: Master's

Department: Sustainable Bioproducts

Category: Forest Resources and Veterinary Medicine

Advisor: Laya Khademibami

Co-Advisor: Elizabeth Stokes and Rubin Shmulsky

Title: Guayule Resin as a Natural Wood Preservative

Abstract: Abstract

The resin extracted from the guayule plant (Parthenium argentatum) has insecticide and fungicide properties which makes it suitable candidate for wood protection industry. This study investigates guayule resin as a natural wood preservative agent, with a focus on identifying the optimal solvent system for the guayule to penetrate into wood cell walls.. The choice of solvent for dissolving guayule resin is crucial and it is important to find a suitable carrier system for guayule.

Initial experiments have evaluated the solubility of guayule resin in various solvents, including acetone, ethanol, toluene, methanol and ethyl acetate. Guayule resin with different concentrations has been used to determine the most effective formulation for wood treatment. Polar solvents, particularly acetone, ethyl acetate and toluene, have shown higher efficiency in dissolving the resin, offering promising solvent systems for further tests. The findings from the solubility and solvent evaluation serve as a foundation for the broader application of guayule resin in enhancing wood durability.

Currently, ongoing leaching tests are being conducted to determine the resin's retention in treated wood including yellow poplar and southern yellow pine. These tests will determine the best solvent system that can ensure long-term resin retention in wood. Once the optimal carrier system is established, future research will focus on examining the treated wood's resistance to termites and fungi, providing a comprehensive assessment of guayule resin's preservative properties. The findings from this research aim to contribute to the development of an eco-friendly wood preservation system that minimizes the environmental impact of traditional preservatives.

Presenter: Cooper Little

Presentation Session: MO6

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Agriculture and Life Sciences

Advisor: Dr. Mary Love Tagert, Agricultural and Biological Engineering

Title: Site Specific Management of Iron Deficiency Chlorosis

Abstract: Iron deficiency chlorosis (IDC) is a common problem throughout the Midwest as well as in the Black Prairie region of Mississippi. Soybeans are valued at over 1.5 billion dollars annually in the state of Mississippi and is the commodity of choice in the Black Prairie region. IDC can cause substantial yield loss in affected areas of the field. IDC is not caused by the lack of iron in the soil but by the plant's inability to uptake iron from the soil. Iron is an essential micronutrient in several plant processes including plant respiration, root nodule formation, and chlorophyll production. The lack of chlorophyll causes chlorosis in newly developed leaves, reducing photosynthesis and yield. Previous research on IDC has tested foliar applied iron, which was proven to be expensive and dangerous; soil nitrate content, which found that excess nitrates can increase symptoms; increased seeding rates, which reduces symptoms; and cultivar testing, which is the most effective management strategy for reducing symptoms. Furthermore, most research on IDC in soybean has been conducted in the Midwest region and is lacking in the Black Prairie. The objective of this study is to evaluate the effect of management strategies often used in the South on IDC tolerant and susceptible cultivars in a humid subtropical climate. Six cultivars were grown in combination with seven cropping systems. Plots that were grown in a corn/bean rotation, received higher seeding rates, or planted after an oat cover crop had reduced IDC symptoms.

Presenter: Qing Liu

Presentation Session: MP4

Level of Study: PhD

Department: Computer Science and Engineering

Category: Engineering

Advisor: Dr. Amin Amirlatifi, Assc Prf & Assc Dir & End Prf Chemical Engineering

Title: Multilinear principal component analysis enabled multi-sensor fusion for rotatory machine fault diagnosis

Abstract: The maintenance of rotating machinery in industrial environments is crucial for ensuring proper functionality and avoiding unplanned downtime. It is essential to identify fault patterns or conditions in the machinery before they occur to perform proper maintenance. Currently, fault diagnosis practices involve using machine learning (ML) algorithms based on vibration and acoustic sensor data to identify fault patterns and make maintenance decisions. However, extracting fault features from multiple sensor data is challenging due to the high dimensionality of multi-sensor data, variability in sensor characteristics and presence of redundant noise associated with different sensors. To address these challenges, a method for machine fault diagnosis is proposed in this work. This approach involves using multi-channel sensor fusion in the frequency domain (FD) and multilinear principal component analysis (MPCA) to address the high dimensionality of the fused data. It aims to extract low-dimensional features corresponding to various fault conditions. These features are input into a 1D convolutional neural network (CNN) for fault classification. Experiments were conducted using a machinery fault simulator (MFS) equipped with vibration and acoustic sensors to evaluate the effectiveness of the proposed method. The results of the experiment show that the proposed method offers significant improvements in detection accuracy compared to state-of-the-art ML algorithms, such as support vector machine, neural networks. It validates the capability of the proposed method in enhancing early fault detection methods for efficient machine maintenance in industrial environments.

Presenter: Flynn Mabowitz

Presentation Session: MO6

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Raheleh Miralami, Center for Advanced Vehicular Systems

Title: Finite element analysis of HeLa cell deformations via acoustic tweezers

Abstract: Finite element analysis of cellular mechanics is a developing field in biomedical engineering and can be a powerful tool for understanding various cellular responses to mechanical stimuli. These responses can include cellular signaling that propagates tissue growth and upkeep, injury healing, and cell death. Developing a better understanding of the mechanical responses to these stimuli can provide useful feedback on membrane mechanics.

Using COMSOL Multiphysics, a simplified HeLa cell model was created to match experimental conditions of HeLa cell compression by acoustic tweezers. This study collected data to develop and validate this model by measuring vertical displacements of the HeLa cell membrane under acoustic pressure. Stress analysis of the membrane was also conducted.

Using collected cellular deformation data and an extensive literature review, this HeLa cell model successfully replicated observed deformations and consistently matched the experimental data. Stress analysis identified potential areas of concern for further investigation into cell membrane injury and mechanics

This model can be used to develop further insight into cellular mechanics. Further stress analysis and adjustment of viscosities can produce data for the study of suspended cellular mechanics and the use of acoustic tweezers in cellular deformation studies.

This model utilized high speed video recording to develop an accurate finite element model of HeLa cell deformations. The work done on this model sets the groundwork for future studies using multiple cell types and the development of more advanced cellular models.

Presenter: Anitha Madapakula

Presentation Session: AP1

Level of Study: Master's

Department: Plant and Soil Science

Category: Agriculture and Life Sciences

Advisor: Dr. Prakash Kumar Jha

Title: Impact of Climate Change in the Productivity of Major Field Crops in Senegal Using the DSSAT Simulation Model

Abstract: Global agriculture faces a lot of challenges because of climate change, and Senegal's main field crops need to be carefully studied to determine how they might be affected. A study was performed to assess the extent of climate change and forecast the crop yield performance in changing climate situation in Senegal using DSSAT. For climate change impact assessment, three climate parameters were studied, and six different climate models were ensembled together to reduce the individual model biasness for future climate in two different RCP scenarios – RCP 2.6 and RCP 8.5. The ensembled suggests Senegal might see variations in rainfall between -7% and 15% and a maximum temperature might increase up to 1.2 °C under RCP 2.6 scenario, while rainfall will be in between -55% and -27% and a probable increment of 4.5 °C in temperature under RCP 8.5 scenario by 2100. It is likely that Senegal will suffer extreme drought and high temperature in future which is very critical for crop growth and development. Therefore, simulations were performed in DSSAT to estimate crop yields by integrating downscaled meteorological data from climate models and gridded soil data from Harvard Soil Data verse. The goal of this research is to improve resilience against the effects of climate change by strategically planning crop responses and yield measures. We aim to optimize Senegalese food production systems by analyzing climate-resilient technologies, thereby supporting sustainable agricultural practices.

Presenter: Sultan Mohammad Manjur

Presentation Session: AO5

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. Ali Gurbuz, Associate Professor, Electrical and Computer Engineering

Title: Automated Detection of Seafloor Gas Seeps in Multibeam Echosounder Data with an Attention-Guided Convolutional Neural Network

Abstract: Seafloor gas seeps are a globally distributed feature that hold substantial implications for ocean carbon cycling, chemosynthetic ecology, energy production, and geohazards. Detection of seafloor gas seeps currently requires human visual interpretation of sonar water column imagery by a trained individual, which is time consuming, costly, and inconsistent. In this study, we introduce a novel dataset composed of 428,396 high-resolution multibeam echosounder (MBES) sonar water column images annotated for the presence and position of gas bubble plume targets generated by seafloor seeps. Leveraging this dataset for training and validation, we present a machine learning model based on an attention-guided convolutional neural network framework for automated gas seep detection in seafloor environments. Additionally, we present an analysis of a range of processing approaches for MBES sonar water column data, evaluating their impact on the seep detection performance of the machine learning model. Finally, our proposed ML framework underwent a rigorous evaluation using a subject-independent validation strategy, achieving an overall accuracy of 87%, with 78% precision and 72% recall rate ensuring robustness and reliability. This research represents a substantial advancement in automated gas seep detection methodology.

Presenter: Rohini Maram

Presentation Session: MO8

Level of Study: Master's

Department: Computer Science and Engineering

Category: Engineering

Advisor: Name: Sathishkumar Samiappan , Title : Associate Professor , Department : Geosystems Research Institute

Co-Advisor: Name : Charan Gudla , Title: Assistant Clinical Professor, Department : Computer Science and Engineering

Title: Deep learning- based automated detection and classification of foreign materials in poultry using color and hyperspectral imagery

Abstract: This study examines the application of Deep learning for detection and classification of small foreign materials (FMs) in poultry meat using color and hyperspectral imagery (HSI). The study employs You only look once (YOLO) object detection models on color images for precise localization, and one-dimensional convolutional neural network (1D CNN), two-dimensional convolutional neural network (2D CNN) was used on HSI (600 – 1700 nm) for classification. Twelve different FMs commonly known as polymers including PVC, PET, LDPE and HDPE, were examined using 52 color and 52 hyperspectral images. Four YOLO models (v5x, v7x, v8x, v10x) were implemented, trained, tested and the performance was evaluated using F1 score, precision – recall curve and mean Average Precision (mAP@0.50). This study determined that YOLOv7x, v10x were most reliable for detection, while 1D CNN showed best balance between accuracy and generalization in classification

Presenter: Alyssa Lea Miller

Presentation Session: MO2

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Te- Ming Tseng

Co-Advisor: Dr. Lorin Harvey

Title: Sweetpotato (Ipomea batatas) Variety Tolerance to Different Herbicidal Weed Control Methods

Abstract: There are limited herbicides labeled for use in sweetpotato (Ipomoea batatas) production in the United States. Therefore, the registration of additional herbicides with different modes of action (MOA) would provide growers added weed control options to enhanced crop yield and provide a more sustainable sweetpotato (SP) production system. As herbicide-resistant weed populations continue to emerge and become more prevalent, weed control strategies need to include herbicides with different MOAs for the long-term success of (SP) cultivation. This research will identify herbicides, along with rate and application time that could be registered for use in sweetpotato. Herbicide tolerance of four (SP) varieties (Beauregard, Orleans, Dianne, and Covington) were evaluated in a screening study. These varieties were selected to represent sweetpotato production areas across the United States in Arkansas, California, Louisiana, Mississippi, and North Carolina. Herbicides evaluated include fluridone, glyphosate, glufosinate, carfentrazone, saflufenacil, acifluorfen, and others. The study involved the foliar application of herbicide treatments at 1X and 0.5X rates using a spray chamber onto individual (SP) plants cultivated in 4x4 inch containers within the controlled environment of the Dorman Hall Greenhouse at Mississippi State University. Visual assessments of herbicide-induced injury were conducted at regular intervals of 7, 14, 21, and 28 days after treatment (DAT), accompanied by measurements of vine length in centimeters. Furthermore, dry root and shoot biomass were quantified at 28 DAT to provide a comprehensive assessment of herbicide impacts on (SP) growth and development. Results indicate varying levels of tolerance among the (SP) varieties to specific herbicides and application rates. Noteworthy trends in visual injury, vine length, and biomass measurements highlight the nuanced responses of the cultivars to different herbicide chemistries.

Presenter: Hossein Mohammadi

Presentation Session: MP4

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Vuk Marojevic

Title: AI-Assisted Network Slicing in O-RAN Architecture Using Federated Learning

Abstract: In the era of 5G and beyond, the dynamic optimization of network resources is critical to support diverse use cases, ranging from enhanced mobile broadband (eMBB) to ultra-reliable low-latency communication (URLLC). This research introduces an innovative architecture that integrates AI-assisted network slicing within the Open Radio Access Network (O-RAN) framework, using Federated Learning (FL) to enhance flexibility, privacy, and scalability. The proposed multi-tier RAN Intelligent Controller (RIC) architecture deploys a centralized RIC to manage computationally intensive AI algorithms, such as Convolutional Neural Networks (CNNs), and distributed RICs for localized, real-time adjustments using lighter AI models, such as Recurrent Neural Networks (RNNs) and Deep Neural Networks (DNNs).This design maximizes throughput and optimizes resource allocation by leveraging FL, which enables decentralized AI training without the need to transfer raw data, preserving user privacy and reducing bandwidth consumption. By adopting this architecture, the 5G network can efficiently handle various slices for different applications, ensuring real-time adaptability to network conditions while supporting continuous learning across distributed RICs.The significance of this research lies in its ability to address critical challenges in 5G network slicing, including resource optimization, throughput maximization, and scalability, while maintaining privacy and reducing computational overhead. As such, this work provides a robust foundation for future developments in AI-driven 5G network management and offers a compelling solution for the evolving needs of modern communication infrastructures.

Presenter: Mohammadali Monfared

Presentation Session: AP1

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Amirtaha Taebi

Co-Advisor: Peshala T. Gamage (Biomedical Engineering and Science,Florida Institute of Technology), William Van Wurm (Mississippi Pediatric Associates), Bahram Kakavand (Nemours Children's Hospital, Florida)

Title: Computational Modeling of Seismocardiography Signals for Enhanced Screening of Congenital Heart defects

Abstract: Congenital heart defects (CHDs) affect approximately 1% of live births globally, with around 40,000 cases annually in the United States. This highlights the need for advanced screening methods. Seismocardiography (SCG) is a non-invasive technique that captures chest surface vibrations caused by heart activity, offering potential for assessing cardiac function. However, the origins of SCG signals in various CHD conditions remain unclear. Computational modeling, specifically digital twin models, can provide insights by simulating how cardiac motion produces SCG signals.

This study investigates how conditions such as coarctation of the aorta (COA), tetralogy of Fallot (TOF), and patent ductus arteriosus (PDA) affect SCG signals. Digital twin models enable personalized simulations, offering a faster alternative to traditional data collection methods.

A computational domain was created using 4D CT images of a healthy subject, including the lungs, ribcage, and chest muscles. Cardiac wall motion was tracked with the Lucas-Kanade algorithm, and the resulting displacements were used as boundary conditions in a finite element model. Material properties were derived from existing studies, and the model's outputs were compared with SCG data from the literature. Key cardiac events, such as valve closures, were identified in the SCG signals.

Preliminary results indicate that this approach successfully simulates SCG signals and highlights key cardiac events. Future work will expand the sample size and incorporate fluid-structure interaction to improve the accuracy of the digital twin model for CHD screening.

Presenter: Caren Mwange

Presentation Session: MO3

Level of Study: Master's

Department: Agricultural Economics

Category: Agriculture and Life Sciences

Advisor: Dr. Ayoung Kim, Agricultural Economics

Co-Advisor: Dr. Brenna Jungers, Agricultural Economics

Title: Regional Economic Resilience to Natural Disasters: Analyzing the role of community preparedness in accelerating hurricane recovery in the US

Abstract: Recovery after natural disasters involves the process of restoration and implementing strategies to reduce future impacts. Understanding which factors help or hinder disaster recovery and resilience will be key as we progress through an era characterized by increasingly frequent natural disasters. Among these factors is preparedness which enhances resilience because it ensures that people have the necessary plans, resources and training to effectively respond to natural disasters. This study investigates regional economic resilience to natural disasters, specifically focusing on Hurricane Harvey, which hit Louisiana and Texas in 2017. We aim to determine whether community preparedness can facilitate a quick recovery in the aftermath of hurricanes. The study will utilize a quantitative approach by analyzing community preparedness measures like nonprofits' financial variables, the presence of nonprofits per capita, and the presence of insurance policies per capita at the county level on recovery. Other factors that drive recovery rates, including economic conditions, socioeconomic variables, and hurricane intensities, will be considered in this study. The need to understand the effects of community preparedness on recovery is more urgent given the increasing frequency of hurricanes and the policy measures in place amid key gaps in terms of the progress made. This study will, therefore, contribute to the broader understanding of disaster management and economic recovery, emphasizing the importance of proactive measures in safeguarding regional economies against future natural disasters.

Presenter: Loan TT. Nguyen

Presentation Session: AO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr Steven R.Gwaltney, Professor, Department of Chemistry

Title: Designing Carbonic Anhydrase Inhibitors: Chemistry Insights from Molecular Dynamics Simulations and Experiments

Abstract: Human carbonic anhydrase II (hCAII) catalyzes the reversible reaction of carbon dioxide and water to form carbonic acid. The active site of hCAII contains a Zn (II) ion and three histidine residues situated 13 Angstroms beneath the surface of hCAII. Sulfonamides can bind to the active site zinc and inhibit the enzyme. Aromatic sulfonamides are especially strong hCAII inhibitors.

We have investigated potential new aromatic sulfonamide hCAII inhibitors with molecular modeling and biophysical characterization techniques, including Circular Dichroism (CD) and Isothermal Titration Calorimetry (ITC). Molecular docking and molecular dynamics (MD) calculations were used to determine how the inhibitors interact with hCAII, and Molecular Mechanics-Generalized Born Surface Area (MM-GBSA) calculations were used to calculate binding free energies and important interactions. The MM-GBSA calculations gave binding affinities that are much more negative but in the same relative order as the ITC data. This order agreement enables us to analyze the details of the inhibitor activities with increased confidence. Notably, DAFO benzene sulfonamides not only exhibited the highest affinity for hCAII but also demonstrated dual binding capabilities, suggesting possible catalytic properties in the presence of metal ions. This presentation will demonstrate how molecular modeling techniques help us understand the binding behavior of substituted aromatic sulfonamides to hCAII.

Presenter: Daniel O. Oguntuyi

Presentation Session: AP2

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Todd Mlsna, Professor, Chemistry

Title: Synthesis and characterization of calcinated Fe3O4-kaolin nanocomposite for efficient aqueous Brilliant Blue dye adsorption

Abstract: Textile wastewater is a major contributor to global water pollution. This study demonstrated the synthesis of a calcined magnetite/kaolin nanocomposite at 200 ℃ (Fe3O4@K-200) via a simple co-precipitation technique. Batch adsorption studies and physiochemical properties of calcined Fe3O4@K-200 for the efficient adsorption of brilliant blue (BB) dye. The Fe3O4@K-200 adsorbent was characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy-dispersive X-ray spectroscopy (EDS). The anionic BB dye was adsorbed by Fe3O4@K-200 at various contact times, initial dye concentrations, adsorbent doses, temperatures, and initial pH values to ensure optimized adsorption conditions. The batch adsorption investigation revealed adsorption capacities of 14.0, 30.8, and 44.2 mg/g for BB dye concentrations of 25, 50, and 100 mg/L at an optimal dose of 0.025g/25 ml at a solution pH of 5. The Langmuir and Freundlich isotherm models were used to examine the equilibrium data. Both isotherms exhibited excellent R2 value (~ 1), effectively capturing the experimental results, while dye removal was controlled by pseudo-first order and pseudo-second-order kinetic model. Thermodynamic data of the adsorption (ΔH =+ 7.99 kJ mol-1; $\Delta G > 0$) suggested that the dye adsorption was non-spontaneous and endothermic. The Langmuir maximum adsorption capacity was found to be 103.23 mg/g. Overall, the nanocomposite (Fe3O4@K) of magnetite (Fe3O4) and kaolin clay is a potent adsorbent for remediating wastewater containing recalcitrant dyes.

Presenter: Daniel Oguntuyi

Presentation Session: MO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Todd Mlsna, Professor, Chemistry

Title: Synthesis and characterization of calcinated Fe3O4-kaolin nanocomposite for efficient aqueous Brilliant Blue dye adsorption

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Presenter: Chibuike Onyeogulu

Presentation Session: MO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Amanda Patrick, Professor, Chemistry

Title: Detection of Ionic Liquid Cations from Dilute Aqueous Solutions using Direct Analysis in Real Time Mass Spectrometry (DART-MS)

Abstract: Ionic liquids (ILs) have several distinctive properties that make them attractive for many applications. In cases where they replace harmful volatile organic solvents they are often considered “green” and in cases where they are recyclable, they may increase process sustainability. However, IL toxicity and environmental impact has not been fully explored and as their usage increases, the risk for them to become environmental contaminants does so also. Given their robustness, ILs may become persistent problems if released. Thus, there is an emerging effort to improve our analytical capabilities at detecting, characterizing, and quantifying ILs from various environmental matrices. This presentation will discuss one such effort toward this overarching goal, namely the evaluation of DART-MS as a potential method to rapidly screen targeted cations from dilute solutions.

DART-MS is an ambient ionization method that allows for rapid detection of chemicals with minimal sample preparation, directly from a surface introduced into the instrument’s sampling region. If compatible with the IL cation target analytes, such a simple sampling method would be ideal for some screening methods. To evaluate this, six ILs were subjected to the analysis from dilute solutions of either HPLC-grade water or tap water diluted with an equal part of HPLC-grade methanol, to final concentrations ranging from ~5-100 ppm. Two different sample surfaces were tested, cotton swabs and Pasteur pipettes. Results show that pipettes produce better results. Furthermore, lower concentrations could be more readily detected from the HPLC-grade solvents, but detection at higher concentrations were still achieved even from tap water.

Presenter: Leticia Orellana

Presentation Session: MO7

Level of Study: PhD

Department: Poultry Science

Category: Agriculture and Life Sciences

Advisor: Dr. Ken Macklin, Department head and professor, Poultry Science

Co-Advisor:

Title: EFFECT OF TRANSLUCENCY AND EGGSHELL COLOR ON BROILER BREEDER EGG HATCHABILITY AND HATCH CHICK WEIGHT

Abstract: A successful hatch has a considerable economic impact on all poultry companies. The aim of the current study was to describe the possible effects of shell translucency (T score) and coloration lightness (L*value) on shell thickness, hatchability, and chick weight. A total of 4320 eggs from broiler breeder flocks were selected for T score and L*value. A 3-point subjective scoring system was used for T score (1=low, 2=medium, 3=high), and an electronic colorimeter for L*value, sorting the eggs as light (avg. L*=80.7) or dark (avg. L*=76.0). Data were analyzed using the GLIMMIX procedure of SAS (V9.4), and Tukey's HSD test to separate means; a significant difference was considered when P≤0.05. Results suggest that the color of the eggshell was related to the egg weight at collection (P=0.0056) with dark eggs being 0.6 g heavier than light eggs. Dark eggs had a 3.8 % increased hatchability (P=0.0481) and yielded 6 µm thicker shells (P=0.0019) compared to light eggs. Regarding translucency, eggs with T score of 1 had a 6.9 % higher hatchability (P=0.0127) and 0.7 g heavier chick weight (P=0.0385) compared to T score 3. However, T score 1 eggs had shells 28 µm thinner than the T score 2 and 34 µm thinner than T score 3 (P<0.0001). These results suggest that eggshell translucency and coloration lightness can be good non-invasive indicators of eggshell thickness, hatchability, and chick weight in broiler breeder flocks.

Presenter: Abhishek Panchadi

Presentation Session: AO3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Estimation of Soil Organic Carbon Using Hyperspectral Indices Obtained from Proximally Sensed Data and Prediction Using Machine Learning Models

Abstract: Soil organic carbon (SOC) prediction is critical in understanding soil health, nutrient cycling, ecological dynamics and plays a significant role in promoting sustainable land management and assessing environmental conditions. Conventional SOC quantification, on the other hand for a larger sample set, can be costly and time-consuming, and it produces a substantial quantity of waste that cannot be recycled. This study aimed to enhance prediction of SOC levels using hyperspectral data. A pot experiment was conducted for producing variability in the soil samples which were then assessed for SOC, correlating it with hyperspectral indices. The Walkley and Black wet oxidation method was employed to measure SOC, while spectral readings were taken using the ASD Field Spec Pro 4 spectroradiometer (350-2500 nm). Seven crucial spectral indices were calculated, and various non-linear machine learning models, including Random Forest (RF), Support Vector Machine (SVM), Relevance Vector Machine (RVM), Decision Tree (DT), and Artificial Neural Network (ANN), were optimized using R software. ANN demonstrated the best generalization for SOC prediction, with Root Mean Square Error (RMSE) of 0.08 (calibration) and 0.07 (validation) and Mean Absolute Error (MAE) of 0.06 (calibration and validation). Sensitivity analysis (SA) of ANN was performed using lek's profile method. SA identified Soil Organic Carbon Index (SOCI) and Hue Index (HI) as the most sensitive variables. These findings suggest hyperspectral radiometric data's potential for large-scale SOC mapping, highlighting its value for precision agriculture and environmental monitoring.

Presenter: Basant Pant

Presentation Session: MO7

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Kevin M. Hunt, Sharp Professor & Director Human Dimensions Laboratory, Dept. of Wildlife, Fisheries & Aquaculture

Title: Wildlife Acceptance Capacity: A Systematic Literature Review from Conceptualization to Application

Abstract: The negative impact of human-wildlife interactions coupled with neglect of human dimensions in wildlife management has led to the emergence of the Wildlife Acceptance Capacity (WAC). Assessing WAC helps wildlife managers understand stakeholder's support for conservation, identify conflicts, and develop effective management strategies. This study reviews 125 journal articles on WAC from 1988 to 2022 using the Search, Appraisal, Synthesis, and Analysis (SALSA) technique.

The review demonstrated that WAC publication growth has followed two phases: a dormant concept development phase until 2000 and an active application phase post-2000. Early definition confusion was clarified by integrating scholars' suggestions. WAC is now customized using social psychology theories and is increasingly applied in wildlife management. The review highlights a need to focus on the least concerning carnivore species. It identifies a collaboration gap between high and low Human Development Index countries, emphasizing the importance of international cooperation for effective policy and conservation efforts.

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: Impact of timber price trend and volatility on Loblolly pine plantation optimal rotation age in the US South

Abstract: Timber price trends, volatility, and their impacts on optimal harvesting decisions were determined for loblolly pine plantations in the southern United States (US). Maximum land expectation values (LEVs) were calculated using discounted cash flow (DCF) analysis across a range of real, before-tax discount rates, site indexes, and planting densities. Annual percentage rates of change (APRs) of real quarterly pine stumpage prices in $/tonne over 25 to 40 years were determined for pine sawtimber (PST), chip-n-saw (CNS), and pulpwood (PPW) obtained from the Timber Mart-South. Volatility was described by the trend models' mean square errors. Price trends and volatilities were incorporated into the DCF analyses to determine the implications of long-term pine stumpage market stochasticity on maximum LEV and optimal rotation. The negative price trends over the past 25 to 40 years reduced optimal rotation ages and maximum LEVs compared with the base case of assuming constant timber prices. Investing in pine timberland with low site quality was not advised across planting densities if a 6% minimum rate of return was required. A key finding was discovering the same was true at 5% when timber prices were considered stochastic; constant timber prices did not reveal this outcome. Overall, these findings show how the market through timber price operates to affect not only timber supply in the short run but also timberland valuation in the long run. Keywords: Land expectation value, Price trends, Stochasticity, Stumpage prices, Volatility

Presenter: Ryan Paulk

Presentation Session: MO4

Level of Study: Master's

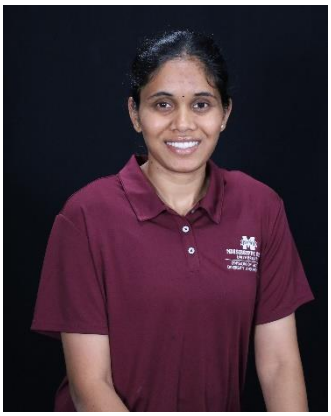
Department: Biological Sciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Heather R. Jordan, Professor, Biological Sciences

Title: Evaluating the potential for fumonisin B1 remediation through insect farming

Abstract: Fumonisin B1 (FB1) is one of the most prolific and potent mycotoxins found in corn. The majority of FB1 is produced by the fungal endophyte, Fusarium verticillioides. Multiple avenues for mitigation and control of F. verticillioides and FB1 are used both pre- and post-harvest to optimize the value and versatility of corn. A new method for post-harvest mitigation of FB1 contaminated corn was explored in these studies with two farmed insect species: the house cricket, Acheta domesticus and the yellow mealworm, Tenebrio molitor. Both species are valued for their low environmental impact and potential as high protein animal feed supplements. When reared on species-specific, nutrient-optimized diets treated with low, medium, and high levels of purified FB1 neither insect incurred increased mortality. Negative effects on the growth of either insect were only observed at the highest levels of FB1 in T. molitor ($P < 0.05$). Both insects were able to eliminate FB1 from their bodies by a minimum of 96.0% in A. domesticus and up to 99.7% in T. molitor when detected by HPLC-FLD. Significant differences between the FB1 levels of diet, insect meal, and frass were only observed in T. molitor ($P< 0.001$) indicating metabolism with confirmation by LC-MS/MS. The abilities of these two farmed insects to grow without accumulating FB1 suggest it may be possible to use them to salvage nutrients from corn unsuitable for human or animal consumption.



Presenter: Sushma Perati

Presentation Session: MO6

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. S. D. Filip To, Professor, Agricultural and Biological Engineering

Title: Evaluation and Characterization of Capacitive sensors for Cotton Moisture Measurement

Abstract: Moisture content (MC) of cotton is crucial in determining the quality of final product of a gin, it is one of the most important physical properties. For high quality cotton the ideal moisture content should be 6-7% (Wet basis). Two sensors which were based on capacitance principle were assessed under static (In laboratory) and dynamic (in Gin) modes. In dynamic mode both sensors were highly correlated (Linear) to MC% values obtained from oven-method (gold standard). The correlation values of FP-32C and Capacitor plate were R^2 = 0.934 and R^2 = 0.9527 respectively.

To condition the cotton to different moisture contents in static mode, six relative humidity levels (treatments) 40%, 50%, 60%, 70%, 80% and 90% at 50 degree C temperature were used to obtain a range of MC from 4% to 14%. Whereas in dynamic mode the three treatments were: T1= Ambient cotton (Stored in shed), T2 = Dry cotton (RH - 24.7%, 34.4%), T3 = Wet cotton (RH - 74.5% and 94.4%).

Moisture Balance (MB) from Veritus Inc. was used as reference for measuring MC in static mode and Oven-method was used for measuring MC in dynamic mode. Comparison between MB and oven-method was performed with four different sample preparations to develop correlations between the two methods. Paired t-test analysis was conducted to evaluate which is close and found that “Only lint” and “normal samples” MC readings are close to Oven readings compared to “one-seed” or “two-seeds” samples. From the observations, these sensors can be used in real-time with proper adjustments, since they are highly correlated with MC.

Key words: Post-harvesting Processing, capacitive sensors, gold standard, Conditioning, Static mode, Dynamic mode, Moisture Balance, Non-destructive method.

Additional Information: Sponsored by the USDA Agricultural Research Service (USDA-ARS) under reference # 58-6066-9-038 in collaboration with the Agricultural and Biological Engineering Department of Mississippi State University.

Presenter: Sushma Perati

Presentation Session: MP1

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. S. D. Filip To, Professor, Agricultural and Biological Engineering.

Title: Characterization of Cotton Moisture Sensors: A study in Static and Dynamic Modes

Abstract: The objective of this study is to characterize two capacitive sensors and to evaluate their suitability for measuring the moisture content (MC%) of cotton during its flow through the gin. The sensors were tested in both static (velocity = 0) and dynamic modes. In static mode, the evaluated moisture content ranges for the FP-32C sensor and a custom-designed capacitor plate were 3.52% to 19.65% and 5.42% to 15.26%, respectively. In dynamic mode, the ranges were 4.9% to 14.5% for the FP-32C and 4.9% to 14.7% for the custom capacitor plate. In-flow (Dynamic mode) measurements using both sensors showed a strong linear correlation with moisture content determined by the oven method.

In static mode, the Moisture Balance (MB) (M5-Thermo 163M) was used as a reference of the measurements. A comparison between the MB and oven method readings was also conducted. Four different sample preparations were tested to see which yielded results closest to the oven method. Among the preparations, "only-Lint" and "Normal" samples were found to correlate closely with the oven method readings compared to “one seed” or “two seeds”, as determined through paired t-test analysis. It was observed that the presence of seeds in the cotton significantly influenced MB measurements, likely because the MB delivers results more quickly than the oven method.

Overall, this study demonstrates that, with appropriate adjustments and sampling techniques, both capacitive sensors are suitable for real-time use in cotton gin environments to provide a non-destructive method of moisture measurement and effectively close the loop on maintaining the ideal moisture content of the cotton being ginned.

Key words: capacitive sensors, Static mode, dynamic mode, Moisture Balance, Non-destructive method.

Additional Information: Sponsored by the USDA Agricultural Research Service (USDA-ARS) under reference # 58-6066-9-038 in collaboration with the Agricultural and Biological Engineering Department of Mississippi State University.

Presenter: Sujan Poudel

Presentation Session: AP1

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Quinoa Drought Tolerance: Morpho-physiological Responses During Flowering

Abstract: Quinoa (Chenopodium quinoa Willd.) is a C3 crop member of Amaranthaceae native to the Andean region. This is a highly nutritious annual pseudo-cereal species with a complete protein containing all nine essential amino acids the human body cannot produce and hence called “golden grain”. Due to its health-benefiting values, quinoa cultivation has continuously increased in recent years, exhibiting its ability to grow in several climatic conditions. Quinoa cultivation in the United States is still in its early stages, but it has the potential to become a more significant crop. Although quinoa is known to be relatively tolerant to stress, like other field crops, it is also sensitive to drought during flowering. Here, two quinoa genotypes were subjected to different soil moisture conditions (full and low irrigation) during the flowering stage for 14 days to investigate the impact of moisture stress on gas exchange, leaf biophysical properties, reproductive fitness, and yield components. There were marked differences in physiology and pigments between treatments. Gas exchange parameters of both genotypes decreased under drought stress. For instance, exposure to 14 days of moisture stress led to a significant 74% reduction in stomatal conductance and a 60% decrease in transpiration. In addition, an 18% increase in chlorophyll and a 5% increase in anthocyanin were noted. Short-term drought stress affected the flowering and maturity traits, branching, panicle architecture, and yield components. These findings shed light on the genetic variability in quinoa responses to moisture stress, offering valuable insights for quinoa cultivation under diverse environmental conditions.

Presenter: Sujan Poudel

Presentation Session: MO2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Effects of Water Deficit on Cowpea: Physiology, Yield, and Quality

Abstract: Cowpea (Vigna unguiculata) is a popular grain legume crop known for its adaptability to various environmental conditions. Low rainfall and increased evaporation during the crop growing season have become a major concern for sustaining the yield of crops grown under rainfed conditions, including cowpeas. However, resilience to water deficit (WD) at different growth stages has been overlooked. Two experiments were carried out in greenhouse conditions using 2-10 cowpea genotypes to investigate the impact of reduced soil moisture during the V2, V4, R1, and R4 stages. Physiological (stomatal conductance, photosynthetic efficiency, and pigment), morphology (node number and biomass), and yield component traits were measured. Two cowpea genotypes were grown in contrasting conditions: well-watered (WW) and WD during the vegetative (V2 and V4) and reproductive (R1 and R4) stages for 14 days. The results showed a significant reduction in carbon assimilation, stomatal conductance, biomass, and yield across all growth stages. Among all growth stages, the R1 (flowering) showed the most sensitivity to WD conditions. In experiment II, ten cowpea genotypes were exposed to two water regimes to study genetic variability in resilience to stress during the reproductive stage and identify WD-resilient genotypes. Physiological parameters such as conductance, transpiration, canopy temperature, and chlorophyll content displayed significant variation ($p < 0.05$ to $p < 0.001$) among the cultivars and between the treatments. Under WD, chlorophyll content decreased by 23%, stomatal conductance decreased by 94%, and canopy temperature increased by 4.7 °C compared to the WW. Moisture stress reduced the stem diameter by 6% and increased the specific leaf area by 34% compared to the control. Our study assessed the variability in drought tolerance and identified traits or genotypes resilient to drought stress during the reproductive stage.

Presenter: Nasir Qadir

Presentation Session: MO9

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

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

Title: Geographic Influence on Stem Taper of Loblolly Pine (Pinus taeda) in Southern U.S. Forests

Abstract: This study aims to identify the difference in stem taper and volume of loblolly pine across two ecological regions of the southern United States based on geographical area. Specifically, stem analysis data were used to evaluate the variation in taper and volume between the trees grown in Coastal Plains and Southern Appalachian regions. Results showed considerable differences in the taper and total volume of loblolly pine trees in these two regions. The largest errors in volume inside bark were produced when the model was fitted using trees from the Coastal Plains and applied to the trees in Southern Appalachian (mean absolute error (MAE) = 60.15% and root mean square error (RMSE) percentage = 92.10%) or when the Southern Appalachian model was applied to the Coastal Plains (MAE = 74.94% and RMSE = 112.87%). A substantial reduction in error was observed when the model fitting and application data came from the same geographic region; MAE = 9.74%, RMSE% = 14.79 for Coastal Plains and MAE% = 8.45, RMSE% = 12.37 for the Southern Appalachian region. This suggests that to accurately estimate upper stem diameter and volume of different sections, forest managers should consider the origin of model-fitting data when selecting the taper model for their tree stands.

Presenter: Mohammad Abdus Shahid Rafi

Presentation Session: MP4

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. Ali Gurbuz, Associate Professor, Electrical and Computer Engineering.

Co-Advisor: Dr. Volkan Senyurek, Assistant Research Professor, Geosystems Research Institute, HPC2.

Title: Crop Yield Estimation of Corn and Cotton utilizing feature selection techniques and machine learning models on multi-sensor data from UAS.

Abstract: This research presents a study aimed at leveraging Feedforward Neural Networks (FNN), Long Short-Term Memory (LSTM), and Random Forest (RF) networks for the prediction of crop yields using a time-series dataset. This investigation provides an in-depth review of the existing literature related to crop yield prediction and outlines the specific methodology used for processing flow and feature extraction. The soil moisture (SM) map data is acquired from the volumetric SM probe sensor while most other feature data are acquired from the UAS-based LiDAR and multispectral camera sensor over a field area containing cotton and corn, along with the weather data collected from the nearby weather station. The paper further delves into the experimental setup, including data extraction, feature selection techniques, and the training of the predictive models using a time-series dataset comprising both LiDAR and multi-spectral images. An analysis of the obtained results is carried out, offering significant insights into the potential of these models for crop yield prediction. Finally, the paper concludes by summarizing the primary findings and emphasizing the impact of this research in enhancing the methodologies for crop yield prediction.

Presenter: Nafiz Rahaman

Presentation Session: MP2

Level of Study: PhD

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope

Title: Persistent Extreme Heat Exposure Among Socially Vulnerable Communities in the Contiguous United States: A Two-Decade Analysis

Abstract: Heat stress in the United States (U.S.), exacerbated by climate change, poses a significant challenge, particularly for socially vulnerable groups who lack the resilience to handle health risks. Factors such as crowded living conditions, inadequate health insurance, and the high cost of basic needs heighten their vulnerability. While numerous studies examine social vulnerability in heat exposure, long-term analysis of communities consistently facing extreme heat remains underexplored. This study utilizes seven years of Social Vulnerability Index (SVI) data and maximum temperature records from 2000 to 2022 across the contiguous U.S. to assess the heat exposure of vulnerable communities. We employed both linear methods, like correlation and regression, and advanced spatial techniques, including cluster analysis and Geographically Weighted Regression (GWR), to identify counties persistently exposed to extreme heat. Results indicate that 23% of counties showed High-High (HH) SVI clustering across all seven years, with Mississippi having the highest proportion (92%) of counties with persistent HH clustering. Correlations between SVI and temperature ranged from 0.54 to 0.57, revealing a consistent positive relationship. Additionally, California had the highest percentage of counties (56%) with high positive SVI-temperature coefficients over the study period. These findings raise critical questions about environmental equity and suggest that targeted adaptation strategies are necessary to address the disproportionate heat exposure in socially vulnerable communities.

Presenter: Abdur Rahman

Presentation Session: MO8

Level of Study: PhD

Department: Industrial and Systems Engineering

Category: Engineering

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

Co-Advisor: Dr. Mohammad Marufuzzaman, Associate Professor, Industrial and Systems Engineering

Title: Integrating Texture Features and Domain Adaptation for Robust Cross-Domain Moisture Content Prediction in Wood Chips

Abstract: Accurate prediction of wood chip moisture content is critical for optimizing biofuel production and ensuring energy efficiency. In this study, we conduct a comprehensive analysis of five distinct texture feature types extracted from wood chip images to predict moisture content. Our findings reveal that a combined feature set, integrating all five texture features, consistently outperforms individual texture features in predicting moisture content. Building on this, we propose a novel domain adaptation model that utilizes the combined texture features to transfer knowledge from one source of wood chip data to another, addressing variability across different domains. The proposed approach demonstrates significant improvements in prediction accuracy across domains, making it a robust solution for wood chip moisture content assessment in varying conditions.

Presenter: Mahfuzur Rahman

Presentation Session: MP4

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

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

Title: Traffic light recognition and V2I communication between the autonomous car and traffic lights using MAVS simulation and YOLOv8

Abstract: For effective and accurate intersection navigation, an autonomous car must accurately identify the traffic lights. At the same time, it needs to understand the time and phase of the traffic lights. This project presents a comprehensive research initiative focused on enhancing the intersection navigation capabilities of autonomous vehicles through the integration of advanced computer vision and Vehicle-to-Infrastructure (V2I) communication systems. The research unfolds in two distinct yet interconnected parts. In the first phase, V2I communication, establishing seamless connectivity between autonomous vehicles and traffic lights, is simulated within a Mississippi State University Autonomous Vehicle Simulation (MAVS) environment. A small city with multiple intersections has been designed and a traffic light control system has been developed to transmit Signal Phase and Timing (SPaT) messages to vehicles. These messages encompass traffic light phases and timing details for phase changes, allowing autonomous vehicles to adjust their speed and behavior in real-time autonomously. The simulation result demonstrates that the autonomous car detects the traffic light accurately, and it receives a short message indicating the current phase of the light and the time to change into the next phase when it reaches at a certain distance closer to the nearest intersection. In the second phase, an approach utilizing YOLOv8 is proposed to recognize the status of traffic lights. A custom dataset has been developed from our MAVS simulation, and the model undergoes intensive training on this custom dataset to ensure precise recognition of traffic light states.

Presenter: Arma Regmi

Presentation Session: MO1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. David O. Wipf, Professor, Department of Chemistry

Title: High Performance Iron Anode with ZnS Additive

Abstract: An alkaline rechargeable Ni-Fe battery is a potential grid-scale energy storage candidate because of its lower cost, safety, robustness to cycling, and eco-friendly nature. However, issues like electrode passivation, volume change, and hydrogen evolution reaction (HER) during charging have limited the efficiency of the Fe electrode. In this study, we developed a binder-free method to fabricate Fe electrodes with ZnS additive to achieve higher specific capacity and longer cycle life. The presence of sulfides provides the electron transfer pathways and mitigates the electrode passivation during the conversion of Fe(0) to Fe(II). The electrode fabrication was done using the induction heating method. ZnS powder was mixed with powdered iron in different ratios and sintered to form a porous, robust pellet. In the electrochemical studies using an alkaline electrolyte, the Fe electrode with 1% ZnS performed better than those with 2% ZnS and 5% ZnS, respectively. Based on galvanostatic charge-discharge experiments, the discharge time was 8 h at the current density of 1 mA/g for the electrode with 1% ZnS. In contrast, the electrode with 2% ZnS showed a discharge time of 75 s, and the electrode with 5% ZnS had a discharge time of 47 s. All electrodes were robust and stable during the forming and characterization processes. These results suggest an effective binder-free method of electrode fabrication to be used as an anode for the Ni-Fe batteries.

Presenter: Carlos Rivera

Presentation Session: AP2

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Heidi Renninger, Associate Professor, Dept. of Forestry.

Title: Integrative genomic annotation of Populus deltoides

Abstract: Available sequenced genomes online allow for a breakthrough in genetic research, providing a crucial basis for the genetic understanding of various species. Populus deltoides is a poplar species of great interest for its use in bioenergy and ecosystem restoration. Different groups of researchers in China and the USA have made essential contributions to the sequencing and annotation of the Populus deltoides genome. In addition to sequencing the nucleic DNA, the Chinese team sequenced the transcriptome to identify coding regions and annotate them within the genome. Yet, these annotations are only found in positions where a gene can hypothetically be located. On the other hand, the team from Florida, USA, sequenced a different clone and compared its genome with known species, such as Populus trichocarpa (the most closely related and best-annotated species), Arabidopsis thaliana, among others, trying to locate the genes within the genome. Despite these efforts, there are still significant gaps in the available information, including the absence of genes expected to be found in the Populus deltoides genome or the need for more information on the proteins that these genes encode. This project aims to use the various genomic resources available to create a more complete and accurate annotation of the Populus deltoides genome. By integrating and comparing data from different investigations, we seek to fill existing gaps and enrich the genetic annotation of this species. This will improve our understanding of the Populus deltoides genome and provide a valuable tool for future genetic research and biotechnological applications.

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, Pathobiology and population medicine

Co-Advisor: Dr. Graham Rosser, Assistant Research Professor, Comparative Biomedical Sciences

Title: Searching for the Environmental Reservoirs of Antibiotic Resistance in Commercial Catfish Ponds in the Mississippi Delta

Abstract: Since its inception, catfish aquaculture has undergone significant intensification, along with concurrent increase of infectious diseases, particularly bacterial. While an effective vaccine exists for Edwardsiella ictaluri, management of other bacteria remains largely reactive, depending on feed restriction or medicated feeds. Limited availability of approved antibiotics (Aquaflor®, Romet®, Terramycin®) has led to repeated selection pressure, promoting emergence of multidrug-resistant (MDR) bacteria. Analysis of archived MDR E. ictaluri isolates from 1994 revealed MDR plasmids similar to recent studies, with the primary difference between historical and more recent isolates being the lack a 4.6 kb gene cassette associated with florfenicol resistance in their MDR plasmids. Under laboratory conditions, MDR isolates exhibit slower growth rates compared to wild-type strains, indicating a fitness cost to carrying these plasmids, which was also reflected during infectivity trials. The reservoirs for resistance genes associated with approved antibiotics (floR, tetD, tetR, sul2) were assessed from water samples from commercial ponds. Genes related to plasmid mobilization, conjugation, and antibiotic resistance were identified from whole shotgun sequencing using Oxford Nanopore Technologies' adaptive sampling protocol from bacteria harvested from non-selective nutrient agar supplemented with florfenicol and oxytetracycline. Analyses confirmed presence of multiple mobile plasmids carrying resistance genes, and mobile genetic elements in non-pathogenic bacteria, indicating their potential role as reservoirs for spreading resistance through horizontal transfer. This data provides a foundational understanding of antibiotic resistance reservoirs in aquaculture settings and underscores the need for continued research into mitigation strategies for MDR bacteria in aquaculture.

Presenter: Sharon Damilola Samuel

Presentation Session: MP3

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 Food Security, Dietary Quality, and Diagnosed Periodontitis: Analysis of NHANES 2015-2018

Abstract: Food insecurity, inadequate dietary quality, and periodontal disease pose significant challenges to the United States adult population. This study examined the association between food security, dietary quality, and diagnosed periodontitis among U.S. adults using NHANES 2015-2018 data. The total sample size was 9,486 individuals aged 30 and older. The dependent variable was diagnosed periodontitis, and the independent variables were food security as defined by USDA and dietary quality measured using the Healthy Eating Index (HEI 2015), which was categorized into quartiles. The multivariable logistic regression model was adjusted at $p<0.05$ for demographics including race, gender, age, marital status, smoking status, and income. About 51.7% of the participants were female, and 48.3% male, with a mean age of 55.1 and 55.8 years respectively. Most were non-Hispanic White (34.4%), while 26.3% identified as Hispanic, and 22.1% as non-Hispanic Black. Most participants reported full food security (60.4%) and a mean HEI of 54 (out of 100). Households with very low food security were about 1.5 times more likely to report diagnosed periodontitis [AOR=1.57, 95% CI(1.28, 1.93)]. Households with low [AOR=1.29, 95% CI(0.89, 1.43)], and marginal food security [AOR=1.36, 95% CI(1.07, 1.73)] had higher odds of reporting diagnosed periodontitis compared to households with full food security. Dietary quality was not significantly associated with diagnosed periodontitis Q2=[AOR=0.86, 95% CI(0.711, 1.03)], Q3=[AOR=0.91, 95% CI(0.74, 1.12)], Q4=[AOR=0.90, 95% CI(0.72, 1.12)], using Q1 as the reference group. Public health interventions should prioritize food security strategies to reduce periodontitis in U.S. adults.

Presenter: Kristina Schoenthaler

Presentation Session: MP2

Level of Study: PhD

Department: Psychology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Kimberly Renk, Psychology

Title: Caregiving Status of Dependent Children as a Predictor of Well-Being in Retired Grandparents

Abstract: As of 2023, 3% of all children (or just over 2.4 million children) are being raised currently in kinship care, with all these kinship caregivers being grandparents. This estimate represents a significant increase from the 1 million children estimated in 2022 to be living with grandparents (Population Reference Bureau, 2024). With this increase, there has been a significant need to understand how kinship care is related to the well-being of both the children in care/grandchildren and the caregivers/grandparents, with the primary focus of current research being on the children in care/grandchildren. The current study instead aims to examine how kinship care, or active caregiver status, is related to the well-being of grandparents who are already retired. Although previous studies examined the connections among the caregiver status of grandparents, grandparents' well-being, and grandchildren's well-being, there is a lack of research that examines how these variables are related to the perceptions of and feelings toward retirement. Further, there is a lack of research that examines possible sex differences (i.e., grandmother versus grandfather). Using the longitudinal Health and Retirement Study (HRS), differences in well-being while in retirement and any adverse or negative feelings during retirement were examined across grandparent caregiver status (i.e., full time caregiver of grandchildren, primary babysitter, and/or occasional visitation) to determine if caregiver status related to detrimental outcomes for grandparents acting as caregivers.

Presenter: Emma Schultz

Presentation Session: AO4

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

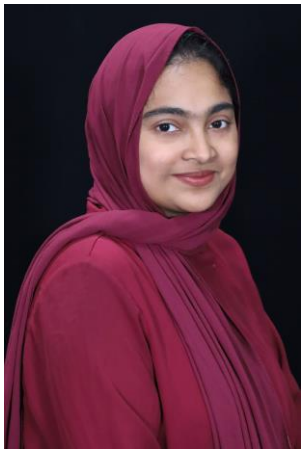
Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Ray Iglay, Associate Professor, Wildlife, Fisheries and Aquaculture

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

Title: Assessing sampling bias across aerial monitoring strategies among animal movements, distributions, and densities

Abstract: Long-term animal population monitoring is essential for informing wildlife management. Erroneous estimates skew our understanding of population parameters. Novel survey methods resulting from technological advancements should be assessed to identify potential sampling bias before adoption and execution. Drones (i.e., Unoccupied Aircraft Systems or UAS) allow for remote monitoring of animal populations. Typical drone flight planning involves large (60-80%) image overlap to create orthomoasic images. However, this methodology may introduce counting errors when monitoring non-randomly dispersed or mobile animals. We evaluated errors associated with counting animals among various drone flight patterns in an agent-based model. Agents were programmed to mimic specific, literature-informed animal density, distribution, and movement patterns. Drone flight patterns included lawnmower patterns with or without image overlap, belt transects, and systematic point counts. Flight pattern was the most important variable influencing counts of a moving animal, followed by animal movement strategy and animal speed. A lawnmower pattern with no or minimal overlap produced the greatest accuracy in animal counts. When the sampling landscape was enlarged and animals distributed in different patterns, we found animal clustering, compared to random or uniform animal distributions, produced the largest variation in bias and drone flight pattern was less important. Our agent-based model is helping identify critical factors affecting sampling bias in this new means of wildlife monitoring. Understanding the influence of animal movements and distributions on population estimates from drone surveys will aid researchers and biologists in deciding whether drones are appropriate for aerial wildlife monitoring and if so, in designing robust surveys.



Presenter: Rezwana Rahman Setu

Presentation Session: AO4

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

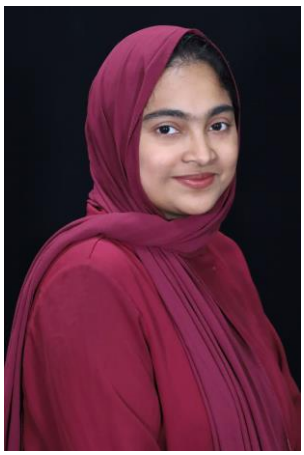
Advisor: Dr. Daniel Peterson, Professor, Biochemistry, Nutrition and Health Promotion and IGBB.

Co-Advisor: Dr George Popescu, Associate Research Professor, Institute of Genomics, Biocomputing and Biotechnology (Thesis director)

Title: Analysis of Systemic Acquired Resistance by Monitoring Redox-Mediated Transcriptional Dynamics in Arabidopsis

Abstract: In plants, systemic acquired resistance (SAR) provides long-lasting, broad-spectrum protection against pathogens through a priming mechanism involving redox and phytohormonal signaling. However, there is limited knowledge regarding transcriptional dynamics during SAR onset and the redox involvement in SAR maintenance. Our previous work has identified several key genes to understand the regulatory dynamics of SAR onset. Here we investigate these dynamics by analyzing the transcriptional activity of GRXS13 (Glutaredoxins, At1g03850), a disease resistance-related CC-type GRX strongly inducible by SA. To track these dynamics, we fused a luciferase reporter gene to

the promoter region of GRXS13 by gateway cloning. We transformed A. thaliana wild-type Columbia ecotype (Col-0) and the SAR-defective top2 mutant plants with this GRXS13 reporter construct using Agrobacterium-mediated floral dip transformation. We infiltrated T1 generation plants with Pseudomonas syringae pv. tomato DC3000 expressing avrRpt2 to prompt SAR. Promotor transcriptional activity was then tracked by monitoring bioluminescence at two-hour intervals after infection for four days in 12 h light and 12 h dark diurnal cycles. We observed oscillatory dynamics of the GRXS13 expression in planta during SAR onset and compared it with the transcriptional response of SAR driver genes previously identified. Comparative analysis of GRXS13 dynamics in Col-0 and the top2 mutant provides insights into how dysregulated redox signaling affects SAR onset. In the future, we plan to analyze the transcriptional dynamics of a larger set of SAR marker genes to further understand the role of redox signaling in plant immunity.



Presenter: Rezwana Rahman Setu

Presentation Session: MP3

Level of Study: PhD

Department: Biochemistry, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr Daniel Peterson, Professor, Biochemistry, Nutrition and Health promotion and IGBB.

Co-Advisor: Dr George Popescu, Associate Research Professor, Institute for Genomics, Biocomputing and Biotechnology (Thesis director)

Title: Analysis of Systemic Acquired Resistance by Monitoring Redox-Mediated Transcriptional Dynamics in Arabidopsis

Abstract: In plants, systemic acquired resistance (SAR) provides long-lasting, broad-spectrum protection against pathogens through a priming mechanism involving redox and phytohormonal signaling. However, there is limited knowledge regarding transcriptional dynamics during SAR onset and the redox involvement in SAR maintenance. Our previous work has identified several key genes to understand the regulatory dynamics of SAR onset. Here we investigate these dynamics by analyzing the transcriptional activity of GRXS13 (Glutaredoxins, At1g03850), a disease resistance-related CC-type GRX strongly inducible by SA. To track these dynamics, we fused a luciferase reporter gene to

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Presenter: Nishat Shermin

Presentation Session: MP2

Level of Study: Master's

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope, Professor and Associate Vice President for Research, Department of Geosciences

Co-Advisor: Dr. Padmanava Dash, Associate Professor, Department of Geosciences; Dr. Javier M. Osorio Leyton, Assistant Professor, Department of Rangeland, Wildlife and Fisheries Management, Texas A&M University.

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

Abstract: Fractional vegetation cover (FVC) models are crucial for managing agricultural landscapes. This study combines UAV imagery with multisource satellite data to improve vegetation classification in rangelands. Using Martin Ranch in Menard County, Texas, we employed a WingtraOne GEN 2 drone with a Micasense RedEdge-P camera to capture high-resolution multispectral imagery and LiDAR data. These were integrated with Google Earth Engine (GEE)-derived Sentinel-1 SAR and Sentinel-2 indices such as Radar Vegetation Index (RVI), NDVI, EVI, and NDWI, along with LiDAR-derived canopy height. A Random Forest (RF) classification model, using nineteen explanatory variables, predicted three FVC types and non-vegetated areas. Preliminary results showed classification accuracies of 77% for grasslands, 70% for shrub/scrub, and 86% for woody plants, with NDVI, NDWI, and EVI being the most important variables. The RF model, featuring 100 decision trees and a mean tree depth of 137, demonstrated the feasibility of this approach. Future research should aim to optimize multiscale methodologies, improve model validation, and incorporate biomass estimation to enhance insights into vegetation health and productivity. Expanding this study to include additional machine learning algorithms, such as Support Vector Machine (SVM) and Gradient Boosting (XGBoost), could further refine classification accuracy. This study highlights the potential of integrating remote sensing technologies with machine learning for sustainable rangeland management, providing valuable contributions to agricultural policy and ecological conservation.

Presenter: Bala Subramanyam Sivarathri

Presentation Session: AO3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Response of Soybean Roots and Nodules to Water-Deficit Conditions

Abstract: The global production of soybeans is hindered by drought during the early vegetative stage, which accounts for 71% of the world's protein and 29% of the oil consumption. Roots are the first portion of the plant to sense and respond to changes in soil moisture. Screening root traits may help to identify genotypes with enhanced drought tolerance. This study aimed to assess the impact of drought stress on root morphology and vegetative growth of soybean genotypes during the early season canopy developmental period. A diverse panel of 17 genotypes with different traits were phenotyped for root characteristics and nodule formation traits in response to drought stress (50% irrigation, water deficit). The results showed that root morphology and biomass were significantly ($p<0.001$) affected under water deficit. Plant height, root length, node number, and specific leaf area were decreased by 62%, 42%, 28%, and 45%, respectively, under water deficit compared to well-watered. Total root length, volume, and surface area significantly decreased by 97%, 44%, and 80%, respectively, under water deficit. In contrast, root diameter was increased by 13% under water deficit. In addition, there was a significant decrease in the number of nodules under water deficit. The R01-416F genotype exhibited a deep root system with the highest shoot and root biomass. Our study identified promising root donor genotypes that can be utilized in breeding to develop superior trait-pyramided cultivars suitable for rainfed environments.

Presenter: Bala Subramanyam Sivarathri

Presentation Session: MP3

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Effects of Temperature Stress and Biostimulants on Root and Shoot Parameters of Soybean

Abstract: Low air or soil temperatures during emergence and seedling establishment can negatively impact soybean growth and development. The application of biostimulants has emerged as a solution to improve crop resilience to stressors at different development stages. Our study evaluated the effects of seed treatment and priming with biostimulants and gibberellins on enhancing soybean tolerance to low-temperature stress. Seeds of soybeans from each treatment were sown in cone-trainer cells and grown in controlled environmental conditions for 30 days at low temperatures (20/10°C, day/night temperatures), low temperature followed by control (20/10°C + 30/20°C) and continuous control (30/20°C) conditions. Regardless of seed treatment, morphology and leaf pigments were significantly impacted by low temperatures. On the other hand, priming with biostimulants improved chlorophyll content by 12% over seed treatment under low temperatures. The root-to-shoot ratio increased by 84% with gibberellins, followed by priming (49%) and seed treatment with biostimulants (17%). Seed priming with B-Sure significantly enhanced shoot biomass under low-temperature conditions, outperforming seed treatment by 2%. However, seed treatment with B-Sure yielded a 5% increase in root biomass compared to seed priming. These findings suggest that low temperatures hindered shoot growth and development, with a more pronounced impact on shoot biomass. The effectiveness of biostimulant and gibberellin treatments varied under low temperatures during the early vegetative stage, influenced by the specific active ingredients of the biostimulants.

Presenter: C. Camilo Suarez Barazeta

Presentation Session: AO4

Level of Study: PhD

Department: Wildlife, Fisheries and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Dr. Fernando Yamamoto

Co-Advisor: Dr. Jordan Heather

Title: Production Performance of Channel Catfish (Ictalurus punctatus) Juveniles Fed Diets Supplemented with Carvacrol

Abstract: Carvacrol is a natural compound found in plants like thyme and oregano, and it is known for promoting growth and health in fish. This study assessed the effects of carvacrol supplementation in diets for channel catfish juveniles. The phytocomponent was added to the diet at 0.0, 0.5, 1.0, 2.0, and 4.0 g/kg of feed. Seven hundred and fifty fish were equally distributed in 25 aquaria (30 fish/tank; n=5), operating as a recirculating aquaculture system. After 84 of feeding, fish were group weighed to compute the production performance, and three fish per tank were anesthetized to collect blood samples and further euthanized to assess the condition factor and the condition indices. Blood and plasma samples were collected for hematological and immune responses. An additional three fish were euthanized for whole-body proximate composition (fat, dry matter, and ash). The results were analyzed with one-way ANOVA, and significant differences were observed for weight gain, where fish offered diets supplemented with 4.0 g/kg presented a decreased production performance, and feed intake, along with increased viscerosomatic and hepatosomatic indices. No significant differences were observed in the intraperitoneal fat index, condition factor, and survival. In conclusion, these preliminary results suggest that the inclusion of carvacrol at low concentrations does not adversely affect the production performance of channel catfish fingerlings. Nevertheless, given the physiological role of the liver in the elimination of toxins and other exogenous substances, it is crucial to assess whether this concentration could induce hepatic damage or inflammation.

Presenter: Ander Talley

Presentation Session: MP4

Level of Study: Master's

Department: Computer Science

Category: Engineering

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

Title: Binary Point Cloud Encoding

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 potential to increase training speeds during deep learning tasks.

Presenter: Thevathayarajh Thayananthan

Presentation Session: MO6

Level of Study: PhD

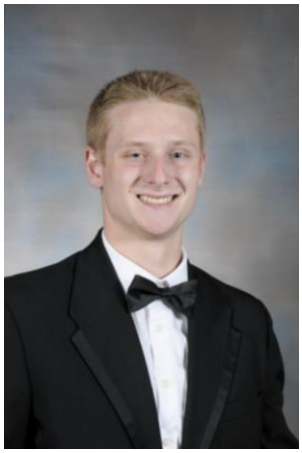
Department: Agricultural and Biological Engineering

Category: Engineering

Advisor: Dr. Xin Zhang, Assistant Professor, Agricultural & Biological Engineering

Title: Cotton boll localization system to enable autonomous cotton-picking using YOLO and SAM

Abstract: Cotton is the leading cash crop in the United States, and its estimated annual contribution to the U.S. economy exceeds $120 billion. The 'Cotton Belt,' comprising 17 southern states including Mississippi state, plays a significant role in this production. Cotton harvesting is crucial in ensuring the quality of cotton bolls. Bolls are harvested in a single pass when all are fully opened, but early-opened bolls are left on the plant until the harvesting day. These early-opened bolls can face adverse weather, reducing cotton fiber quality and causing yield loss. To overcome this issue, a cotton boll localization system using computer vision is proposed. Detecting cotton bolls is challenging due to variable outdoor lighting, color overlaps with the cloud, and distant bolls from different rows. This study compares advanced deep learning architectures, specifically YOLOv8, YOLOv9, and YOLOv10, using default settings for cotton boll detection under field conditions. A dataset of 339 images, captured over 12 days in sunny, cloudy, and partially cloudy weather, was used. YOLOv8-m and GELAN-C performed better than other models, with YOLOv8-m achieving a mean Average Precision (mAP), Precision, and Recall of 0.863, 0.745, and 0.829, respectively, while GELAN-C showed mAP, Precision, and Recall values of 0.863, 0.817, and 0.768 for test dataset evaluations. Additionally, the Segment Anything Model (SAM) was utilized to segment lint with seed after detection using YOLOv8-m and GELAN-C. The proposed system shows potential for integration into autonomous platforms for robotic cotton picking, improving both accuracy and efficiency in cotton harvesting.



Presenter: Sam Theobald

Presentation Session: MO6

Level of Study: Master's

Department: Agricultural and Biological Engineering

Category: Agriculture and Life Sciences

Advisor: Dr. Mary Love Tagert, Agricultural & Biological Engineering

Title: Low-Cost Precision Agriculture Solutions for Advancing Irrigation Efficiency

Abstract: In Northeast Mississippi, access to groundwater is limited due to drilling depths, and only 37% of the annual precipitation in the region occurs during the growing season. As a result, on-farm water storage (OFWS) systems have been built throughout the region in recent years. These systems capture and store precipitation and runoff that can be used for irrigation during the growing season. Due to the limited amount of rainfall received during the growing season, producers in Northeast Mississippi have a finite amount of water to use for irrigation. This study evaluates the benefits of sector control variable rate irrigation (VRI) on a production field under center pivot sprinkler irrigation in Noxubee County, MS. Elevation, yield, and soil moisture data collected from 2018-2021 were analyzed and used to create two distinct irrigation management zones within the field. Two irrigation treatments were applied both to a “dry” irrigation management zone in one section of the field and a wet irrigation management zone in another section of the field. Each zone was sub-divided into six different pie-shaped sectors, and both irrigation treatments were replicated three times in each zone. Two sets of granular matrix sensors were placed in the centroid of the outermost span of each sector, allowing a buffer on all sides, at depths of 30 and 61 cm to measure soil water tension in the rooting zone throughout the growing season. Soil tension data is being analyzed with yield data to determine if water savings were realized without a yield loss.

Presenter: Roberto Venta

Presentation Session: MP1

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Colleen Scott

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 from biomass 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 vanillin core offers the potential for mechanical and thermal properties like those of some commodity polymers, while the labile acetal group incorporated into the backbone provides degradability to the polymers. We prepared homopolymers and copolymers, which were characterized using 1H NMR, DSC, and GPC. The results show that 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: Xinyu Xie

Presentation Session: AP2

Level of Study: PhD

Department: Psychology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Jarrod Moss, Professor, Psychology

Title: Comparing Theories that Posit a Role for Task Features in Strategy Selection

Abstract: Salient features of a task play an important role in how people create task representations which then influence strategy selection for accomplishing the task. We examined two theories, Represent-Construct-Choose-Learn (RCCL) and Rational Metareasoning (RM), both of which incorporate task features into their models of strategy selection. RCCL theory posits that when a strategy's success rate is low, it indicates that the task representation is not useful and those represented features are irrelevant in this case so people tend to drop these features from the task representation. Conversely, RM theory posits that strategy selection is based on consideration of all available features, with no discrete changes in the features incorporated into the task representation. A study was conducted to examine how participants changed their strategy choices based on the success rate of using a specific task feature. The results showed that neither theory aligned closely with empirical data.

Presenter: Fasiha Zainab

Presentation Session: AP1

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Yong Fu

Title: Managing Equality and Equity in Load Shedding for Wildfire Mitigation

Abstract: The natural and human habitats are significantly threatened because of the increasing frequency and severity of wildfires. In high-risk areas, de-energizing the electrical components has become an essential preventive measure to mitigate the risk of power system-initiated wildfires. These de-energized decisions must be carefully scheduled to prevent disproportionate impact and ensure fairness in load shedding all over the community. This paper proposes a new approach to find a tradeoff between equality in load shedding and fairness in load supply. The proposed equality and equity-based optimal power shutoff plan (EEOPS) ensures the balance between equality and equity by adjusting the shutoff decisions of lines while effectively reducing the wildfire ignition risk in the power system. The performance of the optimal shutoff plan is demonstrated by using the RTS-GMLC test case.

The GSA and the Graduate School congratulate all Fall 2024 participants on their contribution to research!

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